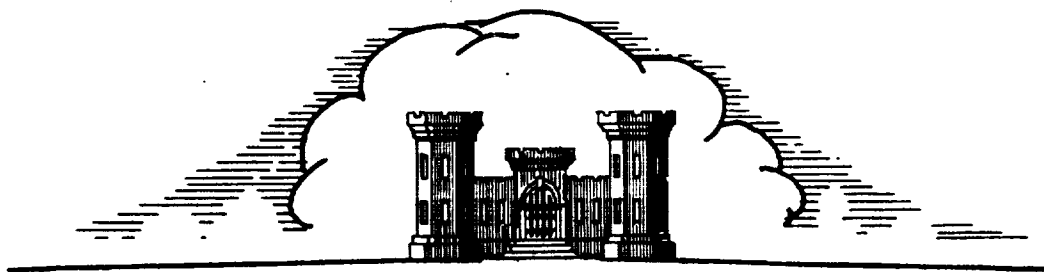


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FLOOD EMERGENCY MANUAL

FOR THE
NEW ENGLAND DIVISION



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NEW ENGLAND DIVISION, BOSTON, MASSACHUSETTS
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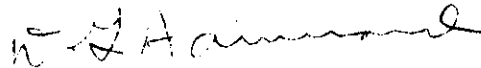
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There are inclosed herewith, for your information and retention, ten revised sheets for the 1951 edition of the Flood Emergency Manual for the New England Division, as follows:

<u>Page No.</u>	<u>Page No.</u>
(1) iii	(6) 41 and 42
(2) iv	(7) 43 and 44
(3) 40 and 40a	(8) 45 and 46
(4) 40b and 40c	(9) 47 and 48
(5) 40d and 40e	(10) 48a and 48b

These sheets should be used to replace those of the same number in the copy of the manual sent you in February 1951 and the old ones destroyed.


D. G. HAMMOND
Colonel, Corps of Engineers
Acting Division Engineer

10 Incl
Revised pages for
Flood Emergency Manual

CORPS OF ENGINEERS, U. S. ARMY
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There are inclosed herewith for your information and retention, three revised sheets for the 1951 edition of the Flood Emergency Manual for the New England Division, as follows: (1) Page iii, (2) Pages 40 and 40a, and (3) Pages 45 and 46.

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FOR THE DIVISION ENGINEER:

D. G. Hammond
D. G. HAMMOND
Colonel, Corps of Engineers
Assistant Division Engineer

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There is inclosed herewith for your information and retention, revised pages for the 1951 edition of the Flood Emergency Manual of the New England Division.

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FOR THE DIVISION ENGINEER:

D. G. Hammond
D. G. HAMMOND
Colonel, Corps of Engineers
Assistant Division Engineer

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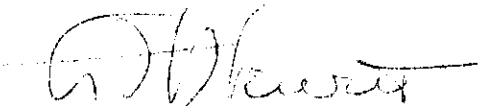
SUBJECT: Flood Emergency Manual, New England Division

TO: *N.E.D. Library*

The general text of the New England Division Flood Emergency Manual has been rewritten since the previous revised pages were forwarded with letter from this office dated Feb. 16, 1953.

The new sheets furnished herewith and listed below, should be put in the copy of the manual sent to you in February 1951 and the obsolete ones of the same number destroyed.

<u>Page No.</u>		<u>Page No.</u>	
---	Title Page	6	Functional Chart
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ii	Index	17	NED Directory
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3-4	Organization	40	Ditto
5-5a	Responsibilities	41-42	Ditto
5b-5c	Other Agencies	45-46	Ditto
5d	Ditto		


L. H. HEWITT
Colonel, Corps of Engineers
Division Engineer

17 Inclosures, as above

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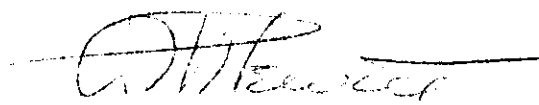
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Listed below are the pages in the New England Division Flood Emergency Manual which are revisions or additions to bring it up to date. The new sheets furnished herewith should be put in the copy of the manual furnished you in February 1951 and the obsolete ones destroyed. Those who have manuals only covering a particular locality will not receive all pages listed; merely those checked below as applicable to that location.

<u>Page No.</u>		<u>Page No.</u>	
---	Title Page	101-102)	Hartford, Conn. data
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L. H. HEWITT
Colonel, Corps of Engineers
Division Engineer

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February 20, 1952

SUBJECT: Flood Emergency Manual, New England Division, 1952 Revision.

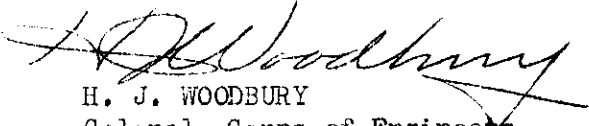
TO: Library, New England Division

The enclosed pages of revisions and additions are furnished for your use in bringing your 1951 Flood Emergency Manual up to date. These changes and additions are furnished in lieu of the complete volume which heretofore has been issued annually.

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Incls.

As listed above


H. J. WOODBURY
Colonel, Corps of Engineers
Division Engineer

CORPS OF ENGINEERS, U. S. ARMY
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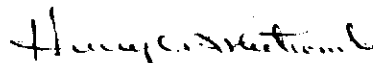
SUBJECT: Revised Pages for Flood Emergency Manual

TO: Library

A copy of the 1951 Flood Emergency Manual for the New England Division, Corps of Engineers, was forwarded to you in February 1951. The following revised sheets showing minor changes in organization and new telephone numbers are furnished you to replace pages of same number in the loose leaf volume which you now have.

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6	Functional Chart - New England Division
7	Organization Chart - New England Division
10	Directory of Agencies
17 and 17a	Directory of Key Personnel, New England Division
18	Executive Office and Administrative Staff.

FOR THE DIVISION ENGINEER:


HENRY A. WHITCOMB
Chief, Operations Division

5 Incls.:
As listed above

FLOOD EMERGENCY MANUAL

CORPS OF ENGINEERS

U. S. ARMY

NEW ENGLAND DIVISION

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L. H. HEWITT

COLONEL, CORPS OF ENGINEERS
DIVISION ENGINEER

Issued February 1951

Revised sheets were
furnished Sept. 1951,
Feb. 1952, Feb. 1953,
April 1953 and Feb. 1954.

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NEW ENGLAND DIVISION

FLOOD EMERGENCY PLAN

PART I

GENERAL

1.01. PURPOSE. - This plan is established as the basis for action during flood emergencies in any or all of the principal river basins in New England.

The policy of the Corps of Engineers is that Division Engineers take constant and positive action to maintain a position of leadership in flood emergency planning in their Division. Division Engineers will furnish all agencies concerned with flood emergency work with copies of the Division Flood Emergency Manual and should assist in every way to insure that the responsibilities of all agencies are mutually understood and that exchange of information and cooperation during emergencies are facilitated.

The manual is furnished for the information and use of all agencies concerned with flood emergency work, and for a guide and ready reference for employees of the New England Division assigned to flood emergency duties.

1.02. MISSION. - The mission of the New England Division during flood emergencies on any river basin in New England is to: -

(1) Keep the General Staff, U. S. Army and the Chief of Engineers advised of flood conditions as provided for in paragraph 4223.05 of Orders and Regulations of the Corps of Engineers, Pages 43, 44, 45 and 46 of this manual.

(2) Keep local authorities advised as to flood conditions (in coordination with the U. S. Weather Bureau which is the official Federal agency for issuing flood warnings) and furnish them advice and information that will enable them to perform preventive, rescue, relief and protective functions to best advantage.

(3) Insure that flood works are maintained and operated satisfactorily and protected from damage. This requirement applies to all works constructed with Federal funds, whether operated and maintained by the Corps of Engineers or by other agencies and to any work constructed with Non-Federal funds if the operation and maintenance of such works are in any way interrelated to the operation and maintenance of Federal works.

(4) Take necessary measures to protect and preserve installations and property of the Corps of Engineers.

(5) Collect and report engineering data on conditions before, during and after the flood as required by paragraph 4223.05 of the Orders and Regulations of the Corps of Engineers as given on pages 43, 44, 45 and 46 of this manual.

(6) As a supplement to the rescue and flood fighting work of other agencies, when humanitarian considerations require it and the local agencies responsible are unable to cope with the situation, the use or loan of Government boats or plant is permitted in an emergency. For details on procedure consult paragraphs 4223.03 and 4227.12 of the Orders and Regulations of the Corps of Engineers which are given on pages 42 and 46 of this manual.

(7) Initiate action necessary for rehabilitation of installations and property of the Corps of Engineers. Procedures for this are outlined in paragraph 4223.04 of the Orders and Regulations of the Corps of Engineers, page 42 of this manual.

1.03. MOBILIZATION . - a. General. - The several Divisions to which duties are assigned herein will at all times and without further authorization take such action consistent with those duties as is necessary to insure accomplishment of the New England Division mission.

b. Alert. - When threatening flood conditions develop, the Chief of the Reservoir Regulation Section will notify the Division Engineer and the Chief of the Operations Division, through channels, of the existing situation, and will issue bulletins on conditions to them daily or more frequently if necessary. When the Division Engineer considers the situation sufficiently serious he will order an Alert to all department heads of the New England Division.

c. Mobilization Procedure. - During the Alert, all department heads will receive the flood bulletins from the Reservoir Regulation Section so they may make preparations for mobilization. Orders for Mobilization for flood emergency activities will be put out by the Division Engineer if the situation worsens. The extent of the mobilization will depend on the severity of the flood. The headquarters staff for flood emergencies, consisting of the Chiefs of Operation, Construction and Engineering Divisions will call upon the various department heads to undertake the duties and responsibilities assigned to them in this manual, as the need develops. Personnel detailed to flood fighting duties will subordinate their normal duties to the performance of emergency operations, and will work whatever hours may be needed to accomplish their tasks.

1.04. ORGANIZATION. - The organization for performance of this plan is shown on organization charts included in this manual as follows: A functional chart of the New England Division, for flood emergencies, is given on page 6. The complete organization chart of the New England Division is given on page 7. The functional chart of the Engineering Division for flood mobilization is given on page 8. Page 8A is an organization chart for the permanent operation and maintenance of the nine flood control dams. The names of personnel in various divisions, who will be sent to the field to advise and direct flood fighting, their order of call, and the localities to which they will go, is given on page 9. Page 10 is a directory of local agencies with which the New England Division cooperates. Page 11 is a map showing the principal watersheds and flood loss zones. Page 12 is a map showing the tie-in by teletype and radio that the Massachusetts State Police has with all state and municipal police stations. Pages 13 to 16 describe this police communication system and list amateur radio operators who will cooperate at flood times by relaying messages. Page 17 gives the home addresses and telephone numbers of key personnel in the New England Division who would be particularly involved in flood emergency operations.

The accomplishment of the flood emergency plan will require a temporary redistribution of the forces of the Operations, Construction and Engineering Divisions, and the Administrative Staff, which will be made by the Executive Office. The Operations and Engineering Divisions will prepare their separate flood emergency mobilization plans. Personnel to cover duties of the Engineering Division as shown in Part III (Page 19) will be specifically assigned as the need develops. Personnel to perform the duties of the Operations Division as shown in Part IV (Pages 22 and 23) will be drawn from the forces of the Operations, Engineering and Construction Divisions as shown in the chart on page 9.

1.05. ASSIGNMENT OF RESPONSIBILITIES. - a. The Division Engineer is responsible for the mobilization and operation of the flood emergency operating procedure outlined herein. All statements and reports to the public and press will be given out by the Division Engineer or personnel specifically authorized by him.

b. Technical Information Section. - Public relations, news releases, and all publicity matters will be referred to the Chief of the Technical Information Section who will coordinate all information given to the public, under the direction of the Division Engineer.

c. Headquarters Staff for Flood Emergencies. - The headquarters staff for flood emergencies consists of the Chiefs of the Operation, Construction and Engineering Divisions. The active director of flood emergency operations for the Division Engineer is the Chief of the Operations Division

assisted by the Chiefs of the Construction and Engineering Divisions. Actions which may require authorization from higher authority will be referred to the Division Engineer or the Assistant Division Engineer for approval. Any serious or unusual conditions should be brought to the attention of one of the above persons.

d. Operations Division. - The Operations Division responsibilities are briefly outlined below, and in much greater detail in pages 22 to 38 of this manual.

(1) Maintain and operate the nine government flood control dams, regulating the outflow in accordance with recommendations of the Reservoir Regulation Section of the Engineering Division.

(2) Through personnel assigned to the field by the Chief of the Division, advise and render assistance to local authorities, where necessary, in the operation and maintenance of their local protection works.

(3) When local efforts are inadequate, advise the Division Engineer of flood conditions that require active participation by the N.E.D. flood fighting and rescue work, when such direct effort is authorized by him and materials and their utilization, with the assistance of the resources of the various N.E.D. divisions and branches.

(4) Provide all necessary safety equipment for personnel. Each Government vehicle on flood emergency work will be equipped with first aid kit, fire extinguisher, tow rope, chains, and one each of the following items of property for each passenger, with a minimum requirement of two each per vehicle, as follows:

- (1) Kapok vest.
- (2) 50 foot life line (3/8" rope).
- (3) Rubber boots.
- (4) Rain coat and hat.
- (5) Flashlight, with spare bulbs and batteries.
- (6) Heavy duty work gloves.
- (7) Pocket first aid kit.
- (8) Engineer Identification Arm Bands

e. Engineering Division. - The responsibilities of the Engineering Division are briefly outlined below and in more detail in pages 19 to 21 of this manual.

(1) Keep the Division Engineer informed of the occurrence of abnormal rainfall and snow melt over the watersheds in the Division and the anticipated effects of the resulting runoff.

(2) Issue bulletins on the above conditions during flood emergencies for the guidance of the Division Engineer and department heads.

(3) Furnish the Operations Division and damtenders with gate operation schedules to provide reservoir storage to afford maximum protection to communities below the dam and to principal damage centers.

(4) Cooperate with the U. S. Weather Bureau in the forecasting of floods and with the Bureau and the U. S. Geological Survey in the exchange of hydrologic data.

(5) Prepare the reports to the Chief of Engineers called for by paragraph 4223.05 of the Orders and Regulations of the Corps of Engineers as given on pages 43, 44, 45 and 46 of this manual.

(6) Collect engineering data such as precipitation and discharge measurements, stage hydrographs, high water profiles, flood damages and observe the behaviour of the flood protection works during flood conditions for use in connection with current and proposed design of flood protection structures.

f. The Construction Division. - The Chief of the Construction Division is a member of the three man headquarters staff which supervises flood fighting activities during high water emergencies. Personnel from the Construction Division will be assigned to flood emergency duties in the field or office as the need develops.

g. The Supply and Procurement Division will hire equipment and purchase supplies as requisitioned by authorized personnel. In the event of a prolonged emergency with active protection work prosecuted by this office, a man familiar with purchasing will be stationed in each area field office to expedite such procurement.

h. The Real Estate Division will provide temporary quarters for area field offices when it becomes necessary to set up such sub-offices for directing flood emergency work.

i. The Administrative Staff. - (1) The Office Service ranch will be responsible for the furnishing of transportation to all personnel of the New England Division engaged in flood fighting activities. Its various sections will perform their regular functions, furnishing supplies under their control, and assign personnel from the reproduction section to obtain photographs as requested. The communications center will operate 24 hours per day when necessary.

(2) The Personnel Branch will furnish assistance to the Operations Division and field chiefs in expediting the obtaining and processing of additional personnel and will advise them relative to all personnel problems.

(3) Legal Branch. - Any legal matters affecting the United States Government will be referred to and investigated by this branch.

1. The Advisory Staff. - (1) The Comptroller will be advised and consulted on all matters requiring his coordination and authorization.

(2) The Property Branch will issue supplies and equipment from the warehouse for use by flood fighting personnel, and other Property which is purchased during the emergency.

(3) The Safety Branch will advise on safe procedures; process accident reports and assist the Operations Division in distributing safety equipment.

(4) The Budget and Accounting Branch will advise on funds available for flood emergency expenditure and the limitations in their use. They will assist in securing additional funds for this purpose if needed, and will expedite payments for obligations incurred in connection with emergency flood fighting.

1.06. COORDINATION WITH OTHER AGENCIES. - a. The United States Weather Bureau is the official agency for the preparation of flood forecasts and is responsible for the issuance of flood warnings. It receives, during impending flood periods, telephoned reports of precipitation and run off every six hours from selected points in the various river basins in the New England Division. From these data stage forecasts are prepared for several locations along the principal rivers. Arrangements have been made to have the various Weather Bureau offices within the Division, report data and forecasts to the Division Office. Similarly, such hydrologic data as the Division has collected from the completed reservoir areas will be made available to the Weather Bureau. In addition, the Division will keep the Weather Bureau informed of all threatening flood conditions in and below the reservoirs.

b. Army and Air Force. - The Division Engineer is authorized to establish direct communications, in connection with flood emergencies, with commanders of the appropriate Armies and Air Forces for the purpose of obtaining necessary troops, signal communications, vehicles, construction equipment, supplies and aircraft for transportation and/or photographic reconnaissance. Such requests for assistance in the repair, restoration and maintenance of flood protection works are not intended to conflict with the responsibilities of major military commanders as outlined in Army Regulation 500-60, extracts from which are given on page 39 of this manual.

c. The Federal Civil Defense Agency. - (1) By Executive Order 10427, dated 16 January 1953, the President designated this agency as the one to coordinate Federal assistance to States and local governments in times of major disasters, as provided in the "National Disaster Act", Public Law 875, 81st Congress, approved 30 September 1953. The authority conferred by this Act and funds provided thereunder are supplementary to those conferred by any other law, and do not impede or limit the Corps of Engineers in the exercise of functions and performance of flood emergency operations authorized under the Flood Control Acts. However, SUCH ASSISTANCE AND ACTION SHALL BE SUBJECT TO COORDINATION BY THE FEDERAL CIVIL DEFENSE ADMINISTRATOR. The Federal Civil Defense Administrator for New England is Albert D. O'Connor, located at 383 Langley Rd., Newton Center, 59, Mass. Telephone Bigelow 4-5560. Federal assistance under the provisions of this Act of 30 September 1950 will in general only be made available after the President has invoked the provisions of the Act, which will only be for "Major Disasters". It is possible for any flood to become a major disaster. Therefore, the local Federal Civil Defense Administrator should be advised of flood conditions as they develop and informed of any direct assistance contemplated by this office.

(2) Executive Order 10427 revokes Executive Order 10221 of 2 March 1951 which designated the Housing and Home Finance Administrator to perform the above duties.

d. The U. S. Coast Guard. - The mission of the U. S. Coast Guard at times of flood is outlined in U. S. Code 14. The applicable paragraph 88 reads as below:

88. Saving Life and Property

(a) In order to render aid to distressed persons, vessels, and aircraft on the high seas and on waters over which the United States has jurisdiction and in order to render aid to persons and property imperiled by flood, the Coast Guard may:

(1) perform any and all acts necessary to rescue and aid persons and protect and save property;

(2) take charge of and protect all property saved from marine or aircraft disasters, or floods, at which the Coast Guard is present, until such property is claimed by persons legally authorized to receive it, or until otherwise disposed of in accordance with law or applicable regulations and care for bodies of those who may have perished in such catastrophies;

(3) furnish clothing, food, lodging, medicines, and other necessary supplies and services to persons succored by the Coast Guard; and

(4) destroy or tow into port sunken or floating dangers to navigation.

(b) The Coast Guard may render aid to persons and protect and save property at any time and at any place at which Coast Guard facilities and personnel are available and can be effectively used.

The local Coast Guard headquarters in Boston is at 447 Commercial Street, Capitol 7-3710 and rescue work is directed by Captain E. J. Suydam. In the event of floods, they can furnish planes, helicopters, amphibious ducks, self bailing surf boats and communication trucks.

e. The U. S. Geological Survey is the official agency for the determination of stream discharge measurements. The New England Division will exchange hydrologic data with the U. S. Geological Survey. The Water Resources Branch of the U. S. Geological Survey is in the P. O. Building, Boston, telephone Liberty 2-5600.

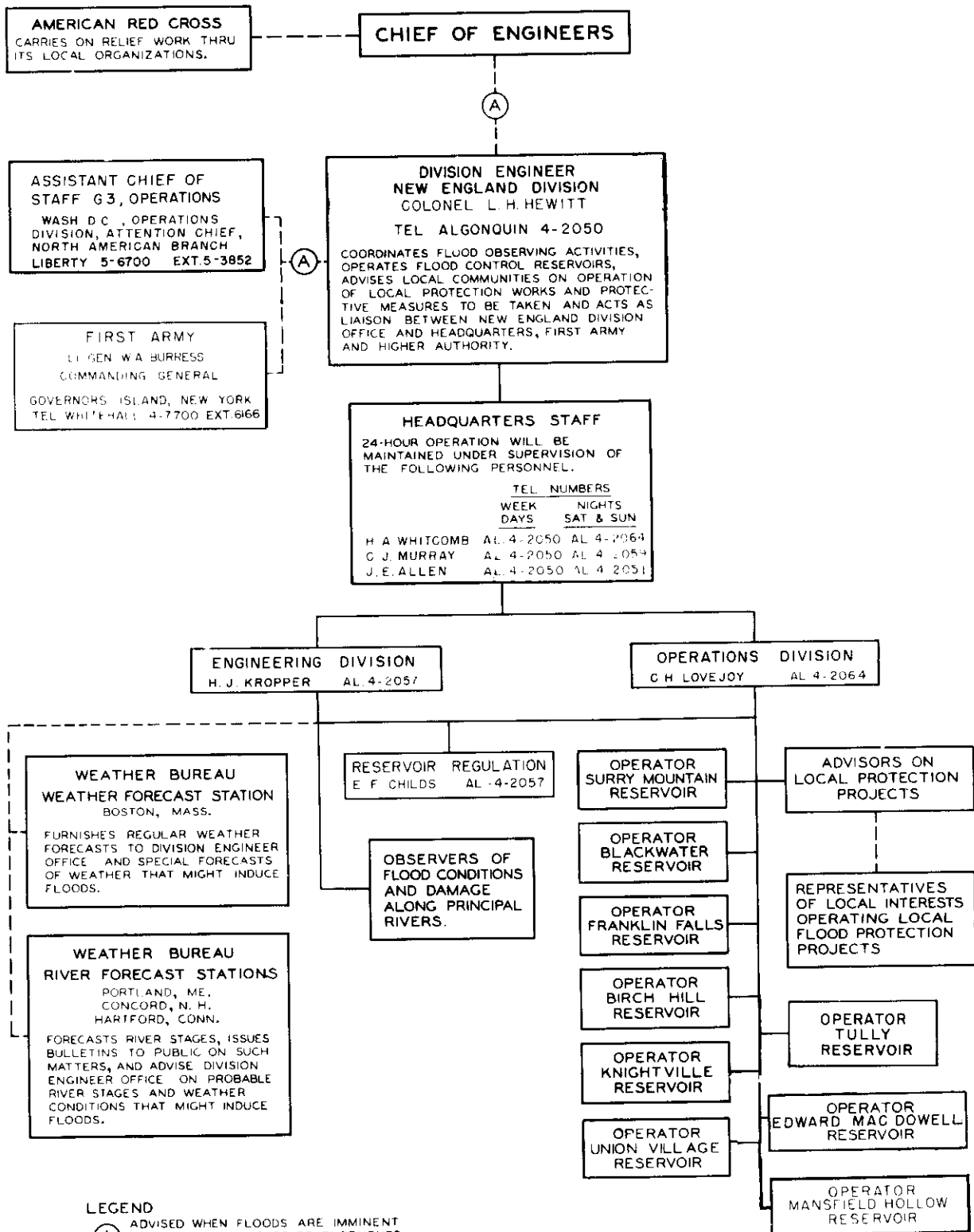
f. The American Red Cross. - Responsibility for the relief of suffering in case of disaster is placed upon the American National Red Cross in its Congressional Charter of 5 January 1905 - "to continue and carry on a system of national and international relief in time of peace and to apply the same in mitigating the suffering caused by pestilence, famine, fire, floods, and other great national calamities and to devise and carry on measures for preventing the same." Red Cross activities concern disaster affected persons to render (1) Assistance, (2) Provide emergency necessities, (3) Provide emergency services, (4) Rehabilitate families. Red Cross activities are mostly personal; the Corps of Engineers is mostly concerned with physical structures except rescue of flood victims. The appropriate Red Cross authorities should be kept informed at all times of the extent of flood conditions, and consequences involved should protection works prove insufficient.

g. State Police. - The state police of Massachusetts, New Hampshire, Vermont, and Connecticut have agreed to transmit messages over their teletype and radio systems to and from our flood control dams in times of emergency, should other means of communication fail. The Massachusetts State Police Headquarters is at 1010 Commonwealth Ave., only two blocks from the New England Division office. Lt. John G. O'Brien is Communications Officer, and has stated such messages would have priority over civilian messages. Pages 12 and 13 of this manual discuss this matter in detail and test runs have proven very satisfactory.

h. The National Guard. - State National Guard organizations may be mobilized at the discretion of the Governor for - (a) Protection of plants or establishments essential to the national safety and security, (b) Protection of facilities necessary for public health, (c) Protection of vital communications and transportation facilities, (d) Evacuation of personnel and property in cooperation with other agencies, (e) As a source of manpower for emergency construction (placing sandbags, patrolling levees, etc.) as a supplement to local interests.

i. Local Police. - Local police are under the direction of their local municipal authorities. Routes should be laid out in cooperation with them, for delivering emergency supplies to the dikes to repair any damage. These supplies may consist of sand bags, rock, gravel, lumber, etc., and the police should direct or restrict traffic so as to avoid any delay in such delivery. They should also prevent any unauthorized persons or vehicles from entering into dike areas or upon roadways on the dikes. Most local police have short wave radio units in their cruising cars. They can assist in the speedy transmission of messages from danger spots to their headquarters. Although these cruisers can in general only talk with their headquarters, their headquarters can send messages to the state police to be relayed to the New England Division office.

j. Amateur Radio Associations. - In the event of a complete breakdown of wire communications, the amateur radio broadcasters can be of help as a supplement to the state police radio system. Pages 13 to 16 of this manual describe such methods and list the names and locations of persons and organizations who have shown an interest in cooperating at flood times. Many others are available and could readily be located in the Amateur Radio Guide which gives all call letters and every operator has one. At East Hartford, Conn., the amateur operators are organized to aid in patrolling the dikes with mobile units reporting any dangerous condition to local flood fighting headquarters immediately.



LEGEND

(A) ADVISED WHEN FLOODS ARE IMMINENT AND KEPT ADVISED OF DEVELOPMENTS DURING FLOOD PERIODS.

NOTE

ORGANIZATION SHOWN TO BE ACTIVATED UPON RECEIPT OF INFORMATION FROM THE WEATHER BUREAU THAT INDICATES DAMAGING FLOODS ARE IMMINENT

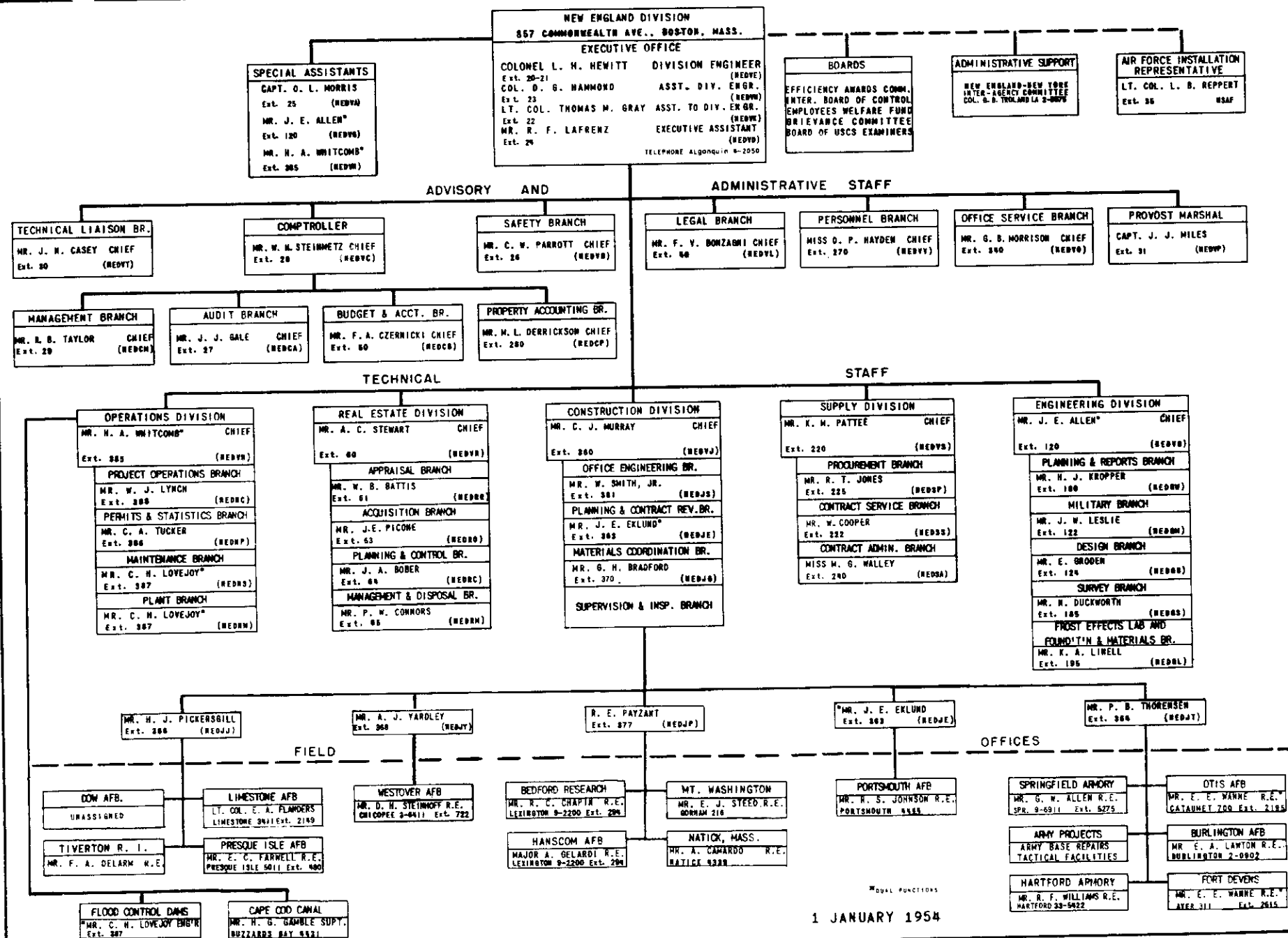
FLOOD EMERGENCY MOBILIZATION PLAN

NEW ENGLAND DIVISION FUNCTIONAL CHART

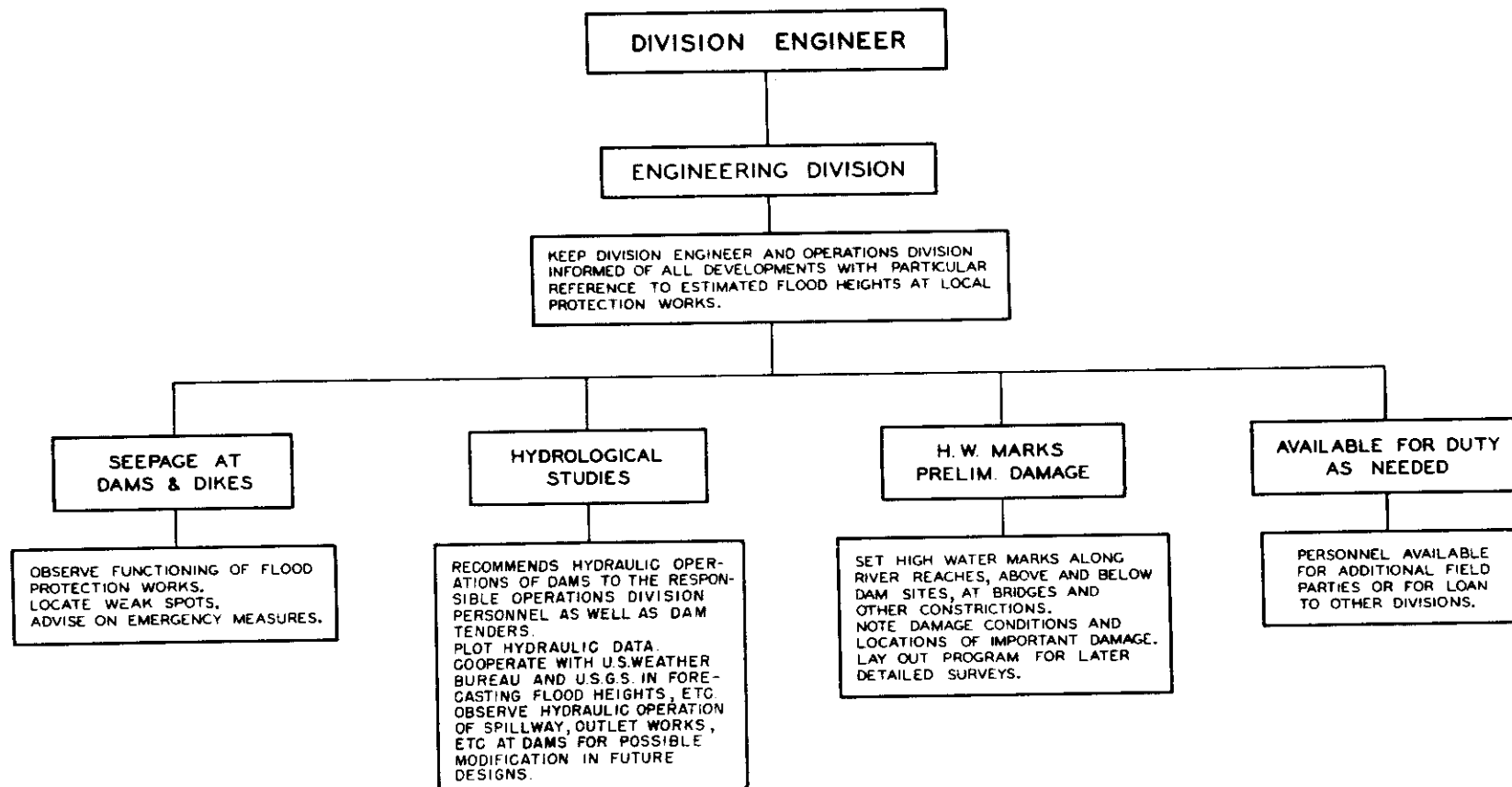
OFFICE OF THE DIVISION ENGINEER
BOSTON, MASS.

FEB 1954

FILE NO M100-50/8



FEB. 1951



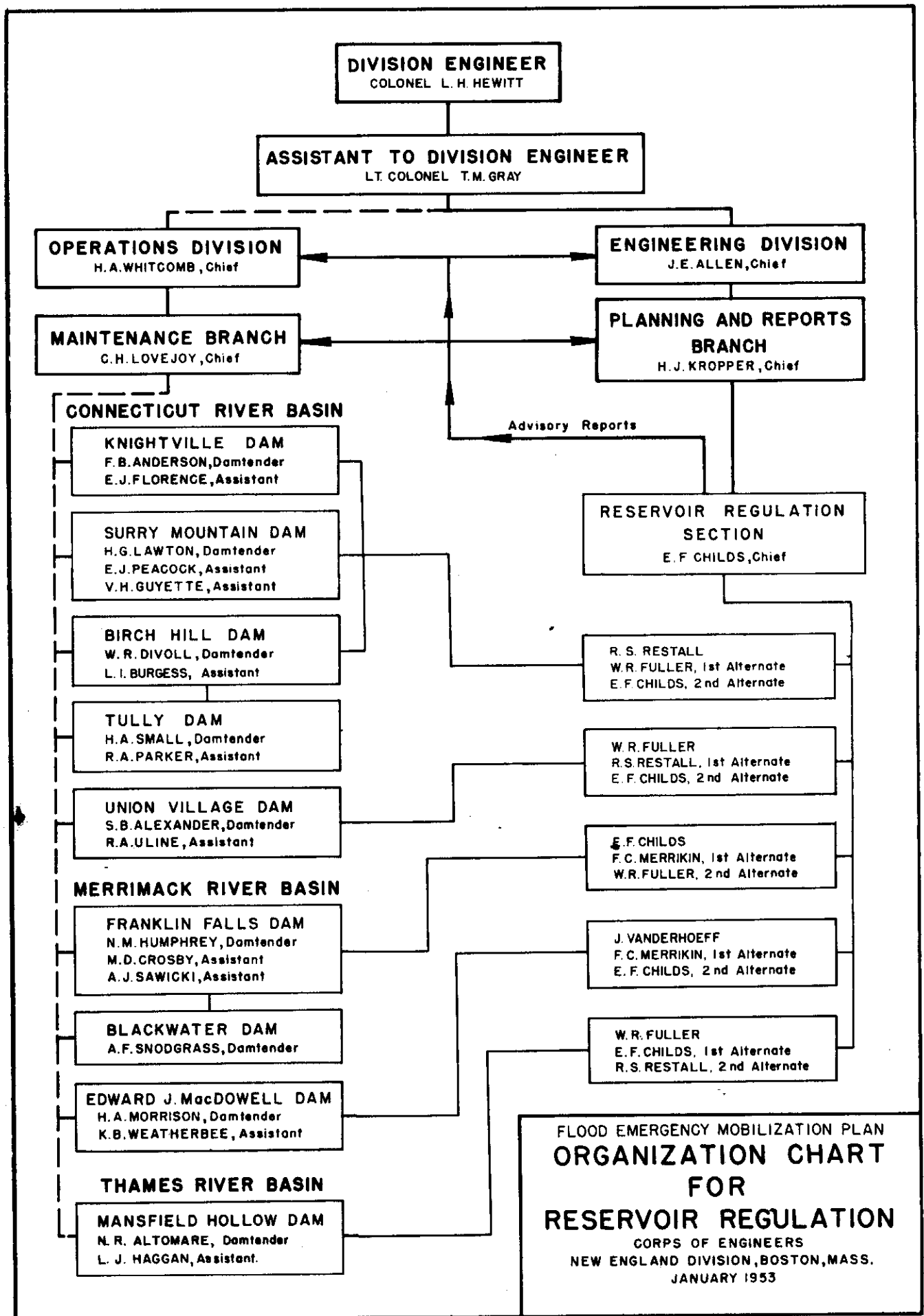
FLOOD EMERGENCY MOBILIZATION PLAN

ENGINEERING DIVISION

FUNCTIONAL CHART

NEW ENGLAND DIVISION
BOSTON, MASS.

FILE NO M100-50/9



FLOOD EMERGENCY ORGANIZATION

OPERATIONS DIVISION

H. A. Whitcomb
C. H. Lovejoy
L. P. Vigneault

TEMPORARY ASSIGNMENTS FROM OPERATION, ENGINEERING & CONSTRUCTION DIVS.

HARTFORD AREA

E. J. Steed (1) Chief
W. J. Lynch (1) Office
C. A. Dorrington (2)
K. F. Fales (2)
H. E. Whittemore (2)

LOWER MERRIMACK

R. C. Chapin (1) Chief
J. L. McManamin (1) Office
A. M. Harriman (1)
J. W. Bishop (2)
C. C. Brown (2)

SPRINGFIELD AREA

H. B. Frederickson (1) Chief
C. A. Tuckor (1) Office
E. Wanne (2)
F. X. Dacey (2)

HOLYOKE AREA

R. S. Johnson (1)
A. J. Donze (2)
I. Gelina (2)
K. Liegerot (2)

FLOOD FIGHTING POOL

K. E. Starrett (1)	J. M. Howes (3)	E. D. Griffin (3)	H. Westgate (3)
E. F. Mendel (1)	C. T. Morin (3)	J. G. Fitzpatrick (3)	N. J. Roppel (3)
J. W. Sloan (1)	J. H. Roman (3)	D. W. Clement (3)	A. J. Kelley (3)
G. N. Harding (3)	E. S. Parker (3)	A. Carosella (3)	
N. Ball (3)	T. P. Regan (3)	F. E. Smith (3)	

RESERVE POOL FOR EXTREME FLOODS

D. L. McKechnie (4)	F. A. DeLarm (4)	P. A. Murphy (4)	J. T. DeFrance (4)
J. E. Eklund (4)	F. J. Wheeler (4)	A. Baglione (4)	W. Slagle (4)
A. J. Yardley (4)	E. H. Champany (4)	J. J. Madden (4)	
J. J. Elasmur (4)	A. Minichiello (4)	R. J. Wilbar (4)	

NOTE: - Personnel assigned to Flood Emergency Work should have the following:

1. Flood Manual.
2. Section containing maps and plans of area to which assigned.
3. Section containing O & R Regulations, circulars, etc.
4. Division telephone directory.
5. Safety equipment.

Extent of mobilization dependent upon magnitude of flood and on developments. The organization is skeletonized and assignments are tentative only, contingent on construction conditions and flood magnitude. Necessity for substitutions and adjustments is anticipated.

(1), (2), (3), and (4) indicate order of call.

U. S. WEATHER BUREAU DIRECTORY OF AGENCIES

Boston, Mass.	Logan Airport	East Boston	7-4200
Hartford, Conn.	Brainard Field	Hartford	7-4620
Concord, N. H.	Municipal Airport	Concord	3470
Portland, Maine	Portland Airport	Portland	2-2111

U. S. GEOLOGICAL SURVEY

Boston, Mass.	Post Office Bldg.	Liberty	2-5600
Augusta, Maine	State House	Augusta	3-4511

AMERICAN RED CROSS

Boston, Mass.			
Headquarters,	17 Gloucester St.	Kenmore	6-6226
Telecommunication Office,	250 Boylston St.	Copley	7-5262
Springfield, Mass.,	275 Maple St.	Springfield	7-4306
			6-3631*
Hartford, Conn.,	125 Trumbull St.	Hartford	7-1891
Nashua, N. H.,	28 Concord St.	Nashua	372
*Nights, Sundays and Holidays			

FIRST ARMY

Governors Island, N. H.	Whitehall	4-7700
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THE FEDERAL CIVIL DEFENSE AGENCY

Albert D. O'Connor, Administrator		
383 Langley Road		
Newton Center 59, Massachusetts	Bigelow	4-5560

AIR TRANSPORT COMMAND

Woburn Field, Mass.	Chicopee	3-6411
	Holyoke	2-4421
U. S. Coast Guard		
447 Commercial Street		
Boston, Massachusetts	Capitol	7-3710

STATE POLICE HEADQUARTERS

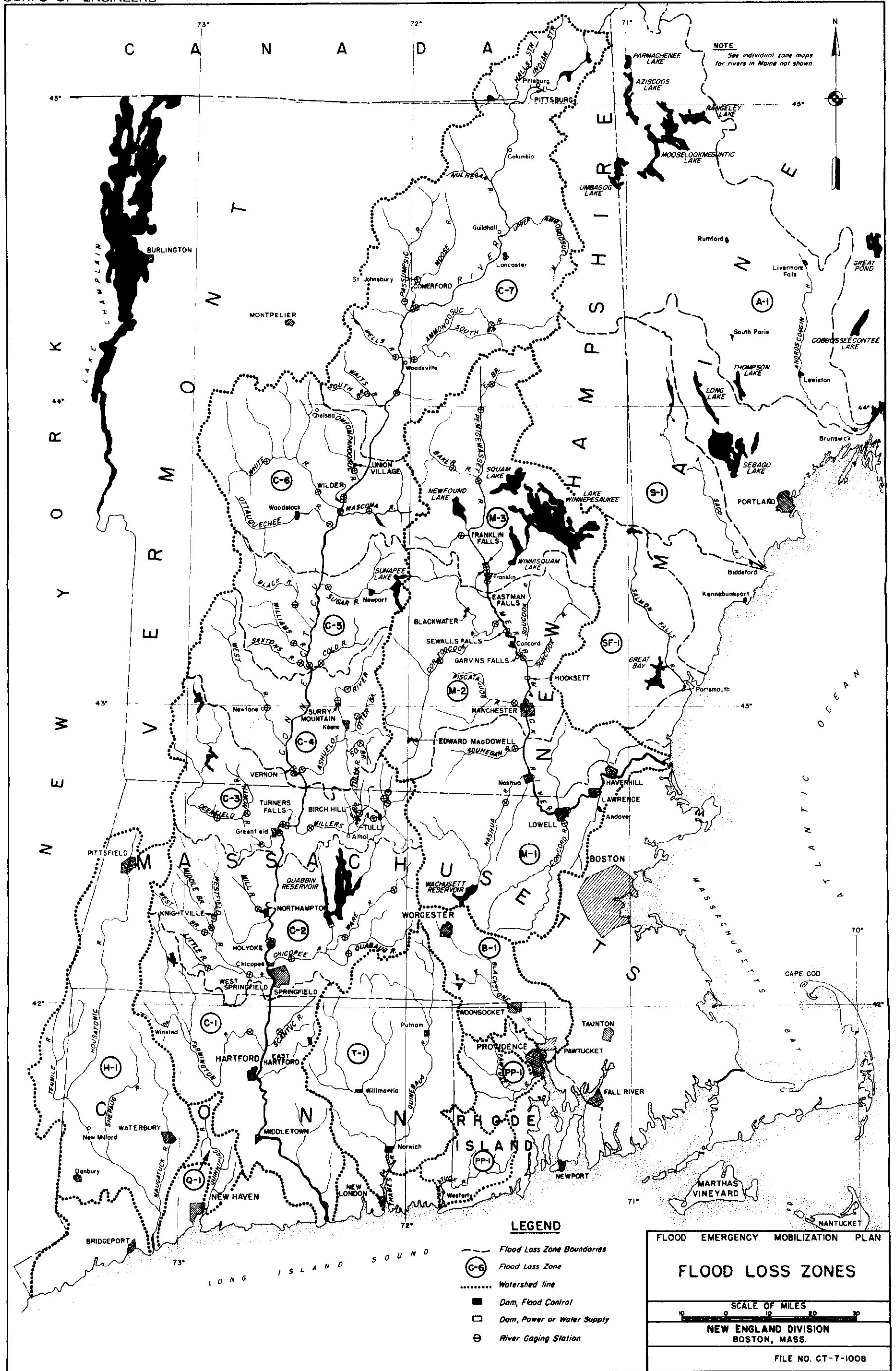
Massachusetts:	1010 Commonwealth Ave.,		
	Boston, Mass.	Longwood	6-4500
Connecticut:	100 Washington St.,		
	Hartford, Conn.	Hartford	5-0181
New Hampshire:	State House, Concord, N. H.	Concord	800
Vermont:	Terrace Street, Montpelier, Vt.	Montpelier	2000

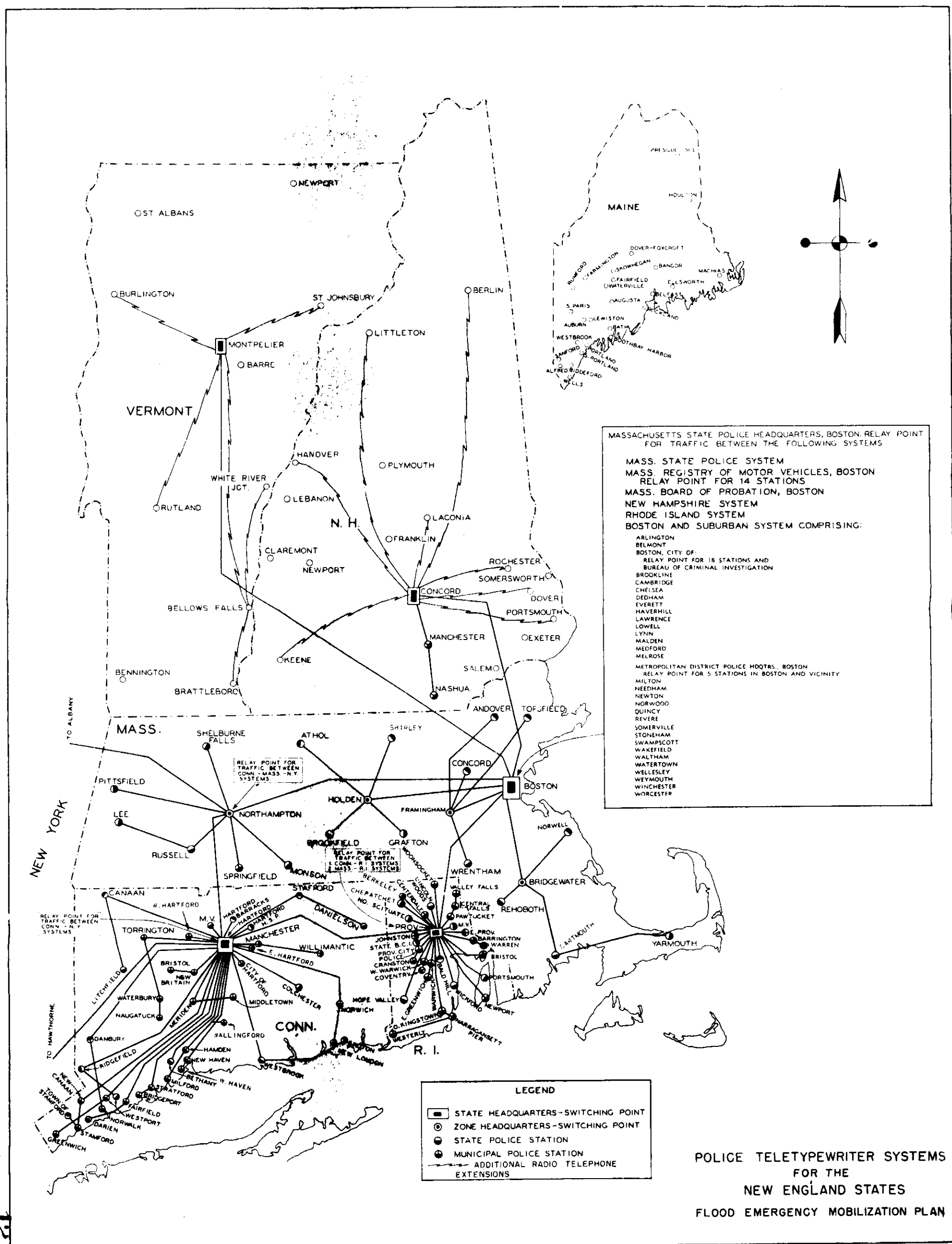
OFFICE OF THE NEW ENGLAND DIVISION, CORPS OF ENGINEERS

857 Commonwealth Avenue, Boston 15, Mass.	Algonquin	4-2050
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NIGHT - SUNDAY - HOLIDAY TELEPHONE CONNECTIONS IN NEW ENGLAND DIVISION OFFICE

ALgonquin 4-2050 Motor Pool	ALgonquin 4-2060 Division Engineer
2051 J. E. Allen	2061 Asst. Div. Engr.
2052 Guard	2062 U. S. A. F. Repr.
2053 F. V. Bonzagni	2063 H. J. Pickorsgill
2054 A. C. Stewart	2064 H. A. Whitcomb
2055 G. B. Morrison	2065 K. A. Linell
2056 J. W. Leslie	2066 K. M. Pattee
2057 H. J. Kropper	2067 A. C. Anderson
2058 E. Groden	2068 R. T. Jones
2059 C. J. Murray	2069 J. E. Eklund





EMERGENCY COMMUNICATION SYSTEM

At times of flood it frequently happens that local telephone are out of order. It is often possible by going directly to the telephone exchange and demonstrating the nature of the emergency, that calls may be made. This possibility should not be overlooked.

Another and very reliable means of emergency communication is through the local and State Police. A map showing the New England Police Teletype Network is shown on page 12. The whole system connects to the Headquarters of the State Police at Boston, at 1010 Commonwealth Avenue. Should the wires be down, the State Police can communicate from all points shown, by way of short wave radio. In fact, in New Hampshire and Vermont the teletype system is limited, and is extended by the radio telephone system.

In Connecticut the State Police cooperate with the amateurs by assigning space to them at 11 State Police barracks where the amateurs have set up stations which the amateurs operate as an auxiliary to the State Police. A list of the amateur stations and call letters is as follows:

<u>Connecticut Amateur Radio Association</u>	<u>State Police Barracks</u>	<u>Location</u>
WTIB	A	Ridgefield
WTIC	B	Caanan
WTID	C	Stafford
WTIE	D	Danielson
WTIF	E	Groton
WTIG	F	Westbrook
WTIH	G	Westport
WLJRI	H & HQ	Hartford
WTII	I	Bethany
WTIJ	K	Colchester
WTIK	L	Litchfield

When these methods fail or cannot be used, assistance may be obtained from amateur radio broadcasters. They operate on a different wave length than the police, and are only tied in with the police in Connecticut, as listed in preceding paragraph. There is listed below the names of such persons and organizations as have shown a previous interest in cooperating at flood times. There are many other such amateurs not listed here who would undoubtedly help. If this list does not include a nearby amateur radio station, efforts should be made to discover one as close as possible and get in touch with the operator of it. In general, the assistance of the police should be requested before the amateurs.

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AMATEUR ORGANIZATIONS

The Connecticut Amateur Radio Emergency Corps has agreed to cooperate in the event of an emergency. This corps is directed by Mr. P. R. deBruyn, 163 South Marshall St., Hartford, Connecticut, operator of station W1LKF. The local groups under this corps are tied together by means of the Connecticut Net on 3640 KC and the Connecticut Phone Net on 3880 KC. The former is managed by Mr. Edwin Roller, W1ORP, of Fox Road, Putnam and the latter by Dr. R. W. Woodward, W1VW, of 41 Middlefield Drive, West Hartford. In addition, the following two stations in adjoining states cooperate with this corps: Richard C. Dunham, W1EWF, River Bridge, Hanover, New Hampshire, and Russel C. Field, W1PSD, Strafford, Vermont. Names listed below, marked with a "#", are emergency coordinators of the Connecticut Amateur Radio Emergency Corps.

AMATEUR RADIO OPERATORS

<u>NAME</u>	<u>ADDRESS</u>	<u>TEL NO.</u>	<u>CALL LETTERS</u>
<u>MASSACHUSETTS</u>			
<u>Boston</u>			
<u>E. F. Barnes</u>	53 Chadwick St.	HI-25184	W1EXH
<u>Chesterfield</u>			
<u>J. R. Manning</u>	RFD Williamsburg Rd.	2256	W1DSO
<u>Holyoke</u>			
<u>L. A. Webb</u>	20 Bullard Ave.	7250	W1HOD
<u>L. B. Smith</u>	1425 Northampton St.	2-4951	W1IEI
<u>H. E. Cronin</u>	123 Pine St.	3-1124	W1QUS
<u>Northampton</u>			
<u>A. D. King</u>	64 Harrison Ave.	1089	W1LUV
<u>Pittsfield</u>			
<u>G. O. Newton</u>	76 Foote Ave.	2-6333	W1DQX
<u>M. A. Holley</u>	38 Hollister St.	6835	W1HAZ
<u>B. J. Murphy</u>	3 McLaughlin Pl.	2-4837	W1DDW
<u>Springfield</u>			
<u>T. F. Cushing</u>	78 College St.	6-1197	W1AWW
<u>C. J. Dougherty</u>	203 Connecticut Ave.		W1VE
<u>R. E. Gordon</u>	37 Webber St.	4-1695	W1KUL
<u>V. W. Padunoff</u>	26 Denton Circle	2-9417	W1EOB
<u>Stoughton</u>			
<u>F. W. Wiley</u>	1089 Turnpike St.	1008R	W1OQV

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<u>NAME</u>	<u>ADDRESS</u>	<u>TEL. NO.</u>	<u>CALL LETTERS</u>
<u>MASSACHUSETTS (cont'd)</u>			
<u>West Springfield</u>			
T. P. Chapman	158 Falmouth Rd.	7-4185	W1KK
G. A. Guernsey	63 Hale St.	9-1105	W1RRW
<u>CONNECTICUT</u>			
<u>Danielson</u>			
#G. R. Caron	62 Broad St.	4-5271	W1EQ
<u>East Hartford</u>			
#H. Clay	334 Silver Lane	8-1047	W1STU
R. E. Forbes	56 Dean Drive		W1RFG
<u>Hartford</u>			
J. S. Erisoty	480 Blue Hill Ave.	2-3654	W1SDJ
#A.E. Jackson	183 Quarry St., Glastonbury	3-2174	W1CGD
J. T. Kneeland	34 White St.	7-9782	W1RMU
P. R. deBruyn	See Amateur Organizations		
<u>Manchester</u>			
A. C. Jones	51 Trebbe Dr.	2-3882	W1MKP
<u>Mansfield Center</u>			
K. W. Fitts	Chaffeeville at Atwood- ville Rd.	Storrs 9180	W1SAQ
<u>Norwich</u>			
A. E. Lawrence	608 New London Turnpike	7-0531	W1SBH
<u>West Hartford</u>			
F. E. Bieber	49 Whitman Ave.	32-6722	W1CLG
<u>Willimantic</u>			
#S. B. Young	46 Maple Ave.	1674W	W1RRE
<u>VERMONT</u>			
<u>Norwich</u>			
E. A. White	RFD 1 (3-1/2 miles from Union Village Dam)	793 M3	W1SP

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<u>NAME</u>	<u>ADDRESS</u>	<u>TEL. NO.</u>	<u>CALL LETTERS</u>
<u>VERMONT (cont'd)</u>			
<u>Strafford</u> R. C. Field	See Amateur Organizations		
<u>White River Junction</u> F. L. Adams	11 Taft Ave.	128M	W1FN
<u>NEW HAMPSHIRE</u>			
<u>Concord</u> A. G. Courchene	60 Broadway	1806J	W1SJS
<u>East Jaffrey</u> H. J. Sawtelle	Main St.	442	W1KPL
<u>Hanover</u> W. M. Rayton	Wilder Laboratory	291J	W1ET & W1OHO
R. C. Dunham	See Amateur Organizations		
<u>Lebanon</u> S. C. Guyer	34-1/2 Hanover St.	411	W1GTY
<u>Manchester</u> M. B. Strickland J. Lovejoy N. F. White	96 North Adams St. 718 Pine St. 363 Concord St.	4-4234 2-2734 2-7589	W1QJG W1BT W1RYC
<u>Nashua</u> E. A. Whitney W. A. Castonguay	27 Burritt St. 110-1/2 Ash St.	710 3837	W1LLD W1RWN
<u>MAINE</u>			
<u>Bangor</u> P. E. Woodman P. L. Sprague A. Lancaster D. S. Webber	43 Bowdoin St. 51 Grant St. 354 14 St. 200 Silver Rd.	9240 4434 3190 21911	W1BNC W1UP W1OLQ W1PCD

February 1953

DIRECTORY OF KEY PERSONNEL - NEW ENGLAND DIVISION

Note: See Page 10 for Night, Sunday and Holiday
Phone Numbers

Division Engineer - Colonel L. H. Hewitt
116 Charles Street, Boston, Mass. - RI 2-9774

Asst. Division Engineer - Colonel D. G. Hammond
105 Cutter Hill Road, Arlington, Mass. - AR 5-9495R

Asst. to the Division Engineer - Lt. Col. T. M. Gray
316 St. Paul Street, Brookline, Mass. - BE 2-6973

Disbursing Officer - Captain O. L. Morris
16 Ernest Road, Arlington, Mass. - AR 5-9464J

Provost Marshall - Captain J. J. Miles
62 Garrison Ave., W. Somerville, Mass. - TR 6-5604

Chief, Engineering Division - J. E. Allen
71 Church Street, Winchester, Mass. - WI 6-1431W

Chief, Operations Division - H. A. Whitcomb
138 Columbia Ave., Cranston, R. I. - Hopkins 1-9348

Chief, Construction Division - C. J. Murray
74 Berkshire Road, Needham, Mass. - NE 3-4372W

Executive Assistant - R. C. Lafrenz
25 Park Drive, Boston, Mass. - CO 6-5948

Chief, Budgets & Acct. Branch - F. A. Czernicki
813 Atwells Ave., Providence, R. I. - EL 1-5944

Chief, Legal Branch - F. V. Bonzagni
89 Churchill Ave., Arlington, Mass. - AR 5-7288

Chief, Office Service Branch - G. B. Morrison
50 Peterboro Street, Boston, Mass. - WE 6-8653

Chief, Personnel Branch - Miss D. P. Hayden
1097 So. Franklin St., Brookville, Mass. - Brockton 6568M

Chief, Planning & Reports Branch - H. J. Kropper
11 Blackman Terrace, Needham, Mass. - NE 3-1456R

Chief, Maintenance Branch - C. M. Lovejoy
4 Watson Ave., Barrington, R.I. - Warren 1-1832

Chief, Hydrological Studies - E. F. Childs
7 Harvard Street, Wellesley, Mass. - WE 5-4812W

Supt. Shop & Storage - A. J. St. Germain
35 Florence Street, Medford, Mass. - MY 8-5806

Chief, Safety Branch - C. W. Parrott
236 Beacon Street, Boston, Mass. - CO 7-5180

Chief, Procurement Branch - R. T. Jones
39 Appleton Street, Saugus, Mass. - SA 8-0615J

Chief, Property Accounting Branch - H. L. Dorrickson
25 Martland Ave., Brockton, Mass. - Brockton 5719

Chief, Management Branch - Robert B. Taylor
1058 Highland Ave., Needham Hts., Mass. - NE 3-0076W

Chief, Real Estate Division - A. C. Stewart
344 Beaver St., Waltham, Mass. - WA 5-3285W

Chief, Technical Liaison - Joseph N. Casey
71 Alstead Street, Quincy, Mass. - GR 2-8773

Chief, Supply Division - K. M. Pattee
1558 Massachusetts Ave., Cambridge, Mass. - TR 6-8747

Comptroller - W. H. Steinmetz
104 Ellis Street, Westwood, Mass. - DE 3-3243W

PART II

EXECUTIVE OFFICE AND ADMINISTRATIVE STAFF

2.01. ORGANIZATION. - See Organization Chart on page 7 and functional chart on page 6.

2.02. DUTIES AND RESPONSIBILITIES EXECUTIVE OFFICE. - a. The Division Engineer is responsible for general direction of all flood emergency activities.

2.03. DUTIES AND RESPONSIBILITIES ADMINISTRATIVE STAFF. - a. The Communication Center. - Normal functions on 24-hour a day basis, all days.

b. The Office Service Branch will be responsible for the furnishing of transportation to all personnel listed in this plan.

c. The General Service Section. - Normal functions.

d. The Reproduction Section will obtain all photographs and furnish required cameras and photographic supplies to the field parties.

e. Legal Branch. - Any claims against the United States Government will be referred to and investigated by this Branch.

f. Personnel Branch will furnish assistance to the field parties in expediting the obtaining and processing of personnel and will advise the field parties relative to all personnel problems.

g. Technical Information Branch will advise division office and field personnel on public relations and publicity matters and all information to the public will be given out by this Branch or cleared through it.

h. Supply & Procurement Division will hire equipment and purchase supplies as requisitioned by authorized personnel.

PART III

ENGINEERING DIVISION

3.01. ORGANIZATION. - Personnel regularly assigned duties in the Engineering Division, in the event of the proclamation of a state of flood emergency by the Division Engineer, shall be relieved of those duties and proceed to the fulfillment of duties assigned herein when so directed by the Chief, Engineering Division.

3.02. DUTIES.

a. Chief, Engineering Division. - The Chief of the Engineering Division shall:

(1) Keep the Division Engineer informed of the occurrence of abnormal rainfall or snow cover over the watersheds in the Division and the anticipated effects of the resulting runoff. In particular, he shall, during periods of abnormal rainfall, inform the Division Engineer of current and anticipated operations at the completed flood control dams.

(2) Dispatch field units to specific river sections.

(3) Collect all engineering data which will be of value in connection with pending or prospective flood control studies.

(4) Maintain liaison with other division chiefs.

(5) Keep the Division Engineer informed of general flood conditions.

(6) After the flood, prepare a brief report for transmittal to the Chief of Engineers, covering the general situation.

b. Chief, Planning and Reports Branch. - The Chief of the Planning and Reports Branch shall:

(1) Furnish to the Operations Division and damtenders such technical data and recommended gate operation as are necessary to afford maximum protection to communities below the dam and to principal damage centers.

(2) Obtain rainfall data and cooperate with the United States Weather Bureau offices at Hartford, Connecticut; Boston, Massachusetts; Concord, New Hampshire; and Portland, Maine; in the exchange of hydrologic data and the forecasting of floods as outlined in paragraph 3.03.

(3) Exchange hydrologic data with United States Geological Survey.

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(3) Exchange hydrologic data with United States Geological Survey.

(4) Prepare and furnish instructions for obtaining data required by the field units.

(5) Obtain reports of flood conditions from the field units and prepare these data for transmission to higher authority.

(6) Keep the Chief of the Engineering Division informed of current flood conditions.

c. Chief, Frost Effects Laboratory and Foundation & Materials Branch. - The Chief of the Frost Effects Laboratory and Foundation & Materials Branch shall:

(1) Observe the functioning of the flood protection works constructed by the Division with a view to possible modification of plans in future designs or to corrective treatment of existing structures.

d. Field Parties. - Field parties, under the direction of the Chief, Planning and Reports Branch, shall:

(1) Collect such engineering data in the form of precipitation and discharge measurements, stage hydrographs, high water profiles, flood damages, etc., as will be of value in current and proposed engineering studies, and for the purpose of preparing a brief report to the Chief of Engineers.

(2) Determine locations where active participation by the Government is essential for rescue work or flood fighting operations to alleviate comprehensive flood damage.

3.03. COORDINATION WITH THE UNITED STATES WEATHER BUREAU.

a. The United States Weather Bureau is the official agency for the collection of precipitation data from Weather Bureau gages and the preparation of flood forecasts therefrom and is responsible for the issuance of flood warnings. It receives, during impending flood periods, telephoned reports of precipitation and runoff every six hours from selected points in the various river basins in the Division. From these data, stage forecasts are prepared for several locations along the principal rivers.

b. Arrangements have been made to have the various Weather Bureau offices within the Division report data and forecasts to the Division Office. Similarly, such hydrologic data as the Division has collected from the completed reservoir areas will be made available to the Weather Bureau. In addition, the Division will keep the Weather Bureau informed of all impending flood conditions in and below the reservoirs.

3.04. COORDINATION WITH THE UNITED STATES GEOLOGICAL SURVEY.

a. The United States Geological Survey is the official agency for the determination of stream discharge measurements.

b. The Division Office will exchange hydrologic data with the United States Geological Survey.

(4) Prepare and furnish instructions for obtaining data required by the field units.

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PART IV

OPERATIONS DIVISION

4.01. ORGANIZATION. - The Operations Division is charged with the general supervision, under the Division Engineer, of all flood emergency construction and maintenance. Organization chart is shown on Page 9.

4.02. DUTIES AND RESPONSIBILITIES. - a. General. - The Operations Division will be responsible as follows:

(1) Maintain and operate completed flood control works constructed by and under the control of the Government. This applies to flood control dams in the New England Division. It is the responsibility of the Operations Division for the following through of all required dam operation in accordance with recommendations of the Engineering Division.

(2) Effect and maintain liaison with local officials and local agencies during the emergency period for the purpose of offering advice and rendering such assistance as is permitted by the limitations of the mission. (See paragraph 4.03 for limitations on assistance)

(3) Through personnel assigned to the field by it, advise and render assistance to local authorities, where necessary, in the operation and maintenance of local protection works constructed by the Division, and in the construction, operation, and maintenance of such emergency protective works as may be projected by local authorities.

(4) Keep the Division Engineer informed of developments by constant contact with his field personnel.

(5) Keep the Engineering Division informed of all developments which may affect the performance of its herein-assigned duties.

(6) Advise the Division Engineer of flood conditions which necessitate emergency repairs and maintenance works to any flood control project threatened by floods.

(7) Advise the Division Engineer and recommend participation in rescue work and flood fighting operations wherever necessary to reduce or avoid flood damage.

b. Chief of Areas as named on Page 9 will be responsible for the direction of construction of maintenance work within their respective areas. (See Standard High Water Maintenance Procedure) Limits of areas are:

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(1) Holyoke Area.

- (a) Connecticut River from southern boundaries of Vermont and New Hampshire to Holyoke - West Springfield and South Hadley - Chicopee town lines.
- (b) Tributaries flowing into the above reach of Connecticut River, including the Millers, Deerfield and Mill (or Northampton) Rivers.

(2) Springfield Area.

- (a) Connecticut River from Holyoke - West Springfield and South Hadley - Chicopee town lines to Massachusetts - Connecticut boundary.
- (b) Tributaries flowing into above reach of Connecticut River, including Chicopee, Westfield and Mill (or Springfield) Rivers.

(3) Hartford Area.

- (a) Connecticut River in Connecticut.
- (b) Tributaries flowing into Connecticut River in above reach, including Scantic, Farmington, Park, Hookanum, Mattabesset, Salmon and Eight Mile Rivers.

(4) Lower Merrimack Area.

- (a) Merrimack River in Massachusetts and the Township of Nashua in New Hampshire.
- (b) Tributaries flowing into Merrimack River in the above reach, including Nashua, Assabet, Sudbury, Concord, Shawsheen and Little Rivers.

c. FLOOD FIGHTING POOL. - (See Page 9) - Personnel from this pool will be available for flood fighting operations in areas noted in paragraph b and any other areas as the exigencies of the occasion demand, as directed by the Chief, Operations Division.

4.03. LIMITATIONS OF ASSISTANCE. - a. General. - It must be made clear to local interests by the Engineer representative at each locality that, while the New England Division is ready and anxious to render them every assistance practicable during an emergency, such assistance must be within the limitations imposed by the law; that is, no unnecessary expense to the United States may be incurred in so doing. It is expected that the Division will expand its normal functions of advisers to local

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interests and will actively participate in flood fighting and emergency work during any major flood. This involves expenditures of Federal funds. Where, in his opinion, such participation is necessary, authorization will be given to the field by the Division Engineer, through the Operations Division. Recommendations for such action will be made by any representative in the field, particularly by those assigned to duty in threatened areas. The recommendations should be transmitted by any means of communication available, preferably by telephone, through the Area Chief to the Chief of the Operations Division, who will immediately report the facts, particularly the reasons why local interests cannot cope with the situation, to the Division Engineer for decision. Upon authorization from the Division Engineer, or upon failing to get in communication with the Division office, the representative in the field making the recommendations may participate in such flood fighting and emergency repair work as the situation may warrant.

b. LOCAL PROTECTION WORKS CONSTRUCTED BY THE CORPS OF ENGINEERS. - The satisfactory functioning of these works is of such importance to the Department as to warrant positive action on the part of its representatives to insure timely placing of stop-logs, assembling of flood fighting forces and materials, and initiation of flood fighting operations. In the event that the representative in the field, upon approval from the Operations Division, considers the works or the abilities of the operating or maintenance personnel to be inadequate to meet the emergency conditions, he will use Engineer forces and funds to insure the proper operation of the works.

c. OTHER PROTECTION WORKS. - In localities protected by works not constructed by the Corps of Engineers, the representative in the field will expend Engineer Department funds, upon approval from the Operations Division, and if the local interests are unable or unwilling to cope with the situation, to supplement the flood fighting work of other agencies or to initiate and proceed with flood fighting work in the absence of any other agency.

d. DIRECT RESCUE WORK. - Engineer Department forces and funds will be used for direct rescue work or to supplement the rescue work of other agencies when humanitarian considerations require it and the local agencies normally responsible are unable to cope with the situation.

4.04. HIGH WATER MAINTENANCE PROCEDURE. - a. General. - The following procedures and methods will be used during high water in the maintenance of walls and earth-dikes and protection of unfinished work which may be under construction by the Division Office. While written for application to works for which the Government is responsible, this

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information will be used in advising and assisting local authorities in their maintenance and protection work if such help is undertaken. The information is available to local authorities in the Manuals of Operation and Maintenance of Local Flood Protection Work which were prepared for each city where local protection works have been constructed by the Division. Copies of this Flood Emergency Plan are being furnished to the local officials.

b. Preliminary Work. - (1) The character of floods in the New England Division does not permit extensive preparatory work after a flood becomes imminent. Normally serious floods occur in the spring, but floods have occurred in every month of the year and the threat should be always in mind.

Conditions change as construction progresses and the Resident Engineer on any work which may be in progress should have in mind at all times a reasonably definite plan of action to be followed in event of high water.

(2) Temporary construction. - Roads which will be used in an emergency should be kept in condition for such use, or at least put in suitable condition at the first threat of a flood. The condition of permanent roads that will be used should be noted and the proper authorities contacted, if necessary, with a view to having necessary repairs made in advance of trouble.

(3) Inventories of Flood Fight Facilities. - An up-to-date inventory of tools, materials and plant available in each area on hand or available for immediate delivery should be maintained in order that deficiencies may be readily determined and arrangements made to obtain necessary materials and equipment without loss of time.

c. Patrols. - Promptly on order of the Division Engineer for mobilization, or when the critical stages set out in the appendices for the various areas are reached or predicted, patrols will be organized and maintained, day and night, until the emergency is over.

(1) The minimum requirement, at the start, should provide for a thorough examination of the dikes at intervals of not more than four hours. As the water rises, the interval between examinations should be shortened until, at major flood stages, the dikes are examined at about hourly intervals, special watchmen being assigned, if necessary, to watch places which might become dangerous.

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(2) Patrolmen should be thoroughly instructed as to their duties and the exact limits of their beats. On each journey of inspection they should carefully examine both slopes of the dike and make prompt report to their superior as to seeps on the landside slopes, indication of scours or washes on the riverside slopes, boils or seeps on the dike berm or near the landside toe of the dike, or any other unusual conditions which might develop. Their instructions should include reading of gages and proper recording of the readings when such is a part of their duties.

(3) Unauthorized traffic on the dikes should be stopped at once, and patrolmen should be instructed to keep people off the dikes unless they can show passes or credentials authorizing their presence there.

d. Emergency Repair Methods. - (1) Scours. - Careful watch should be maintained over stretches of the dike where scouring is likely to occur, such as slopes not protected by riprap, blanketed foreshores, and particularly angles in the dike alignment even though the slope may be protected by riprap. If any indication of scouring is observed, soundings should be taken to observe the amount and progress of the scour. Sandbagging or dumped rock will generally afford the only practicable means of combatting this condition. The open ends of sandbags so used must be sewed or tied after being filled with earth.

(2) Wave Wash. - Dikes may be subjected to wave wash on broad reaches of water despite natural barriers such as trees. Well sodded slopes will usually withstand waves from a storm of about an hour's duration without serious damage. An attack over a longer period may become serious and the slopes should be protected by sandbagging or equivalent protection. Extent of washes can be observed by wading along the attacked slope. Sandbags should be placed in the erosions in as effective a manner as possible, carrying the protection well above the action of the waves. Sandbags used for this purpose require only about one-half cubic foot of material and should be sewed or tied. The aim is to obtain a maximum of coverage with only sufficient weight to hold the sack in place. Work of this type should be undertaken only with proper safety precautions; kapok vests and lifelines should be used by personnel engaged on this work when there is danger of drowning.

(3) Sand Boils. - Boils are serious if within a distance of about one hundred feet of the toe of the earth dike and discharging material. If the sand boil is close to the dike and shows signs of discharging material, it should be treated in the manner shown on Page 35. The level of the water is raised with a sandbag loop of sufficient height to reduce the velocity to a point low enough to prevent the displacement of material, flow being maintained through a small spillway provided for

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the purpose. If boils occur in a small area in considerable numbers and treatment cannot be handled individually, a sandbag dike should be built around the entire area.

(4) Sloughs. - During prolonged high water stages, seeping and sloughing conditions on the back slopes may occur. Such conditions should be observed closely as to progress of seepage up the back slope and the amount of material that is being carried by the water. If the seep velocity becomes great enough to cause, or probably cause, erosion or sloughing of the slope, a sandbag covering should be placed on the seeping area, beginning well out from the toe and progressing up the slope. The covering should extend several feet beyond the saturated area. If the material is available, the affected area should be covered with small brush, straw, or similar permeable material to a depth of two to four inches before placing the sandbag cover. After the covering is placed, close observation should be maintained and additional layers of sandbags placed on the previous ones until the velocity of the seepage is reduced to a point at which the amount of material carried is negligible. (See Page 37).

(5) Special Conditions. - Care must be exercised in the maintenance of drainage openings through or under the dikes. A small amount of debris will prevent proper seating of a flap or gate valve and, if the condition is not promptly remedied, higher stages may prevent proper remedial measures. The situation as respects gated outfalls should be investigated immediately on receipt of instructions to mobilize and conditions checked at least daily thereafter. When the outfall is under considerable head, inspection in most instances can be made at the nearest manhole by checking the direction of flow in the pipe.

Reliable arrangements should be made for placing stop-logs in stop-log structures. Supports should be checked and fitted to insure there will be no delay if it becomes necessary to install them.

(6) Topping existing earth dikes, construction of temporary earth dikes and installation of temporary flash boards on concrete walls. - In emergency, time and other conditions permitting, the grade of an earth dike or concrete flood wall can be safely raised by at least 3 feet and emergency sandbag dikes can be constructed over short distances to any reasonable height. The critical element in such emergency work is that of time. Important, but secondary, is adequate supply of labor and material and proper organization for the work.

In general, floods on major streams within the Division on which local protection works have been built are of the flashy type.

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Further, the grades of the works have been predicated on the regulation of high water flow by a system of reservoirs and until the reservoir systems are completed the dikes and walls may be considered substandard. In the event of a major flood effective emergency work will probably be limited to maintaining effective protection to existing grade of the dike by repair of scours, wave wash, sand boils and sloughing. Six inches to a foot of additional height may be obtained by placement of one or two layers of sandbags on top of the dikes or walls. Effective work beyond this could be accomplished only by drastic mobilization and, on consultation, the city officials should be so advised.

Methods most commonly used in raising the grade of dikes and walls are outlined in the following paragraphs and illustrated by exhibits attached. Their application, under the conditions obtaining in this Division, are recommended in the order listed.

(a) Sandbag Topping or Temporary Sandbag Dike. -

The sack ordinarily used for topping an earth dike or constructing a temporary dike is such as is used for grains or other "feeds" and holds 100 pounds of grain. Smaller sacks may be used if "feed" sacks are not available. Grain sacks, filled with about one cubic foot of earth, weighing about 120 pounds, will provide a unit about six inches high, one foot wide and two feet in length.

The sacks may be filled at the source of material and hauled to the dike or filled from stockpile or borrow area at the dike, conditions determining the method employed. The same is true of method of filling; i. e., power or hand methods.

The open end of the sacks may be sewed but this is not necessary. Open ends which are exposed should be folded under the sack. Otherwise the ends may be flattened on top of or beneath the adjoining sack, whichever is simpler, and will be held closed by the weight of succeeding sacks.

The front line of sandbags in the first layer are laid stretcher-wise along the dike, unsewed ends upstream. Other sacks in the first layer are laid at right angles to the dike alignment, unsewed ends to the riverside. All sacks in the second layer are laid at right angles to the dike line, third layer similar to the first layer, etc., as shown on the attached sketch (Page 33). Joints should be broken. Sacks should be well mauled or "tramped" into place.

Page 32 illustrates the progressive method of increasing the dike height and gives an approximation of the number of sacks required for dikes of various heights.

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A crew of 50 men should fill, carry, and place at least 1500 sacks per eight-hour day, all hand labor, when the source of material is within 150 feet of the point of placement. Production will depend on the conditions at the site. The stated rate can be increased considerably by careful planning and supervision.

(b) Lumber and Sandbag Topping is the most satisfactory method of raising low reaches of earth dike in emergencies. The chief objection is the time required to install. In putting on this topping, as well as any other topping, a careful line of levels should be run and grade stakes set in advance unless the dike top follows a dependable grade-line. Two-by-four or two-by-six inch stakes should then be driven on the riverside of crown six feet apart and one-by-twelve inch boards nailed to landside of the stakes. This wall, backed with a single tier of sandbags, will hold out at least one foot of water. If the second foot is necessary, the layers of bags will have to be increased in number and reinforced. Sandbags are laid substantially in the manner described in (a) above. The stakes should be driven at least three feet in the ground, leaving at least three feet out, which will, in extreme cases, hold a three-foot topping if properly braced behind with sandbags. (See Page 34).

(c) Cut Crown Topping should never be resorted to except as a measure taken in an extreme emergency when filled sandbags and lumber cannot be obtained. When undertaken, it should be done only by authority of the Division Engineer and under very careful supervision. The source of material in this instance is the landside crown of the dike where the depth of cut should not be more than one foot nor riverward of the center-line of the dike.

(d) Method of increasing the height of concrete flood walls of the type built in this Division is shown on Page 38. This method is of limited application owing to limitations of time and the relatively elaborate nature of the temporary bulkhead.

4.05. SUPPLIES. - a. General. - During an emergency the Area Chief is authorized to hire equipment and purchase supplies necessary for the performance of his mission practically without limitation; however, he is required to use discretion in determining the existence of an emergency and be prepared to justify such purchases to the satisfaction of the accounting authorities. Advertising for bids on supplies can be waived when conditions justify such procedure. The Division Office should, when practicable, be consulted by telephone or otherwise prior to making open market purchases in excess of \$100 for emergency requirements and an informal clearance therefor obtained. The attention of the Area Chief is invited to the necessity for care in receiving and receipting for

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supplies and in their distribution, to avoid confusion with similar activities being carried on by local authorities. On commencement of work under these instructions, the Area Chief will delegate an employee to be responsible for all field procurements. This employee will keep the necessary records and submit daily in writing to the Division Office data as to all purchases made, with a brief statement thereon as to the nature of the emergency. Open market procurements in excess of \$100 must be supported with a written quotation from the dealer. This quotation is to be transmitted to the Division Office with the written report. The Division Office will then issue the order and perform the other administrative work incidental to this type of procurement. Care equal to that specified for the purchase of supplies will be exercised in the receiving and the receipting for the same. When justified by conditions, the Area Chief should assign one or more men at each receiving point in the area within his jurisdiction to the job of receiving supplies. Each employee so assigned should be required to keep a record in a suitable book which will show for each consignment of material:

1. The time and method of delivery.
2. Source.
3. Amount and character of the supplies.
4. Disposition of same, including where and how used. Any additional pertinent remarks which might serve to identify any delivery which might be subject to question.

This book, with any receiving slips delivered to him, will be carefully preserved and filed in the area office until such time as all outstanding bills have been settled.

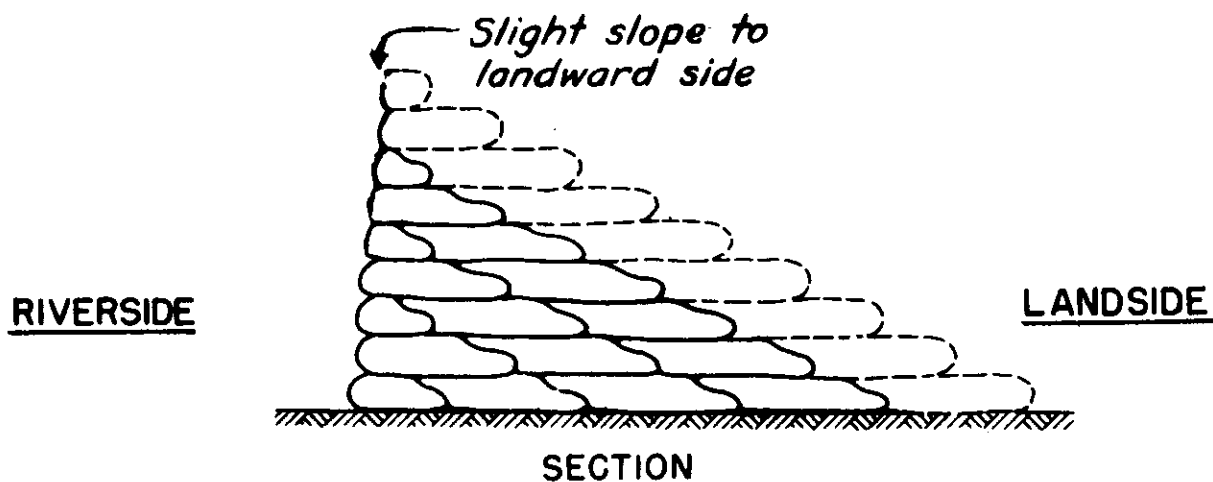
b. Sandbags. - The New England Division does not maintain a stock of sandbags in storage, nor have a reserve supply at Engineer Depots. Frequent checks have shown that dealers in Boston always have from one-half million to one million used bags in their warehouses which should be sufficient for any emergency conditions. The estimated requirements for each municipality are listed in the sections for the various areas. It is desirable that each community have on hand sufficient bags for their immediate needs, and have arrangements with their nearest dealers to furnish their total requirements. The desired stock level for local interests and stock on hand is shown in the following sections for each locality. In the event of an emergency the Chief of Operations will assist in locating local suppliers whereby the existing stocks may be supplemented.

4.06. PLANT AND ITS PROCUREMENT. - The Orders and Regulations permit the use or loan of Government boats or other plant in an emergency to save life. The use of such plant is also permitted to save property, provided that no other suitable equipment is available and it can be spared without detriment to the Government works. When used to save property, only "out of pocket" expense incurred by the United States will be billed to the owner of such property. A few trucks, pumps, small tools and rowboats are the only plant, owned by the Division, of value

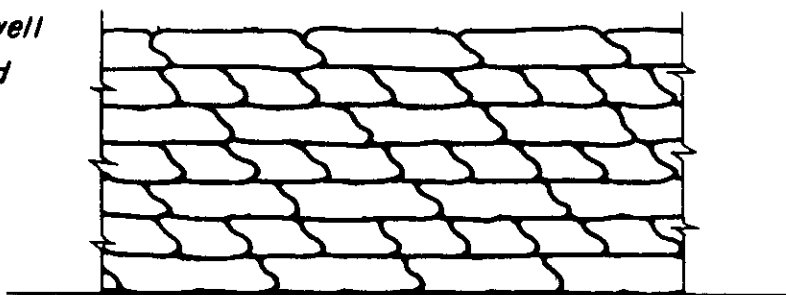
in a flood emergency. Such of this equipment as may be needed will be obtained through the Division office. In a major flood it is probable that Army equipment and personnel at nearby posts, camps, or stations might be called into action through military channels to assist in preventing damage and caring for refugees.

4.07. LABOR AND REGISTRATION. -- Labor may be obtained from the local State Employment office or in the open labor market. A possible source is the 1st Army through the Division Office. The wage rate will be the prevailing rate in each locality. Registration of labor preferably will be made at the sub-offices, although, if found expedient, registration at emergency offices will be permitted.

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Note: Sacks should be lapped at least 1/3 all ways and well mauled or tamped into place.



RIVERSIDE ELEVATION

SACKS REQUIRED PER 100' STA.

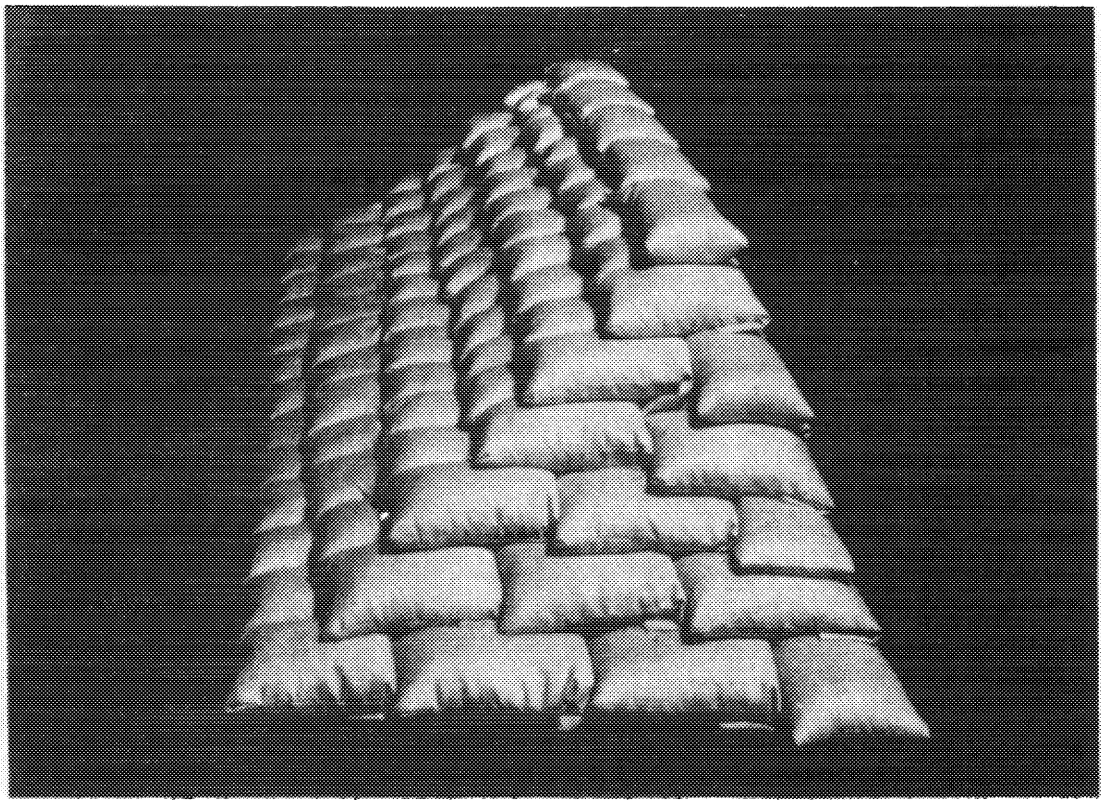
100 lb. "Feed" Sacks - 1 Cu. Ft. Each

Approx. Hgt. Sack Dike	Sacks High	Required
1.5	3	300
2.0	4	750
3.0	6	1400
4.0	8	2250
5.0	10	3250
6.0	12	4500
7.0	14	5950
8.0	16	7600

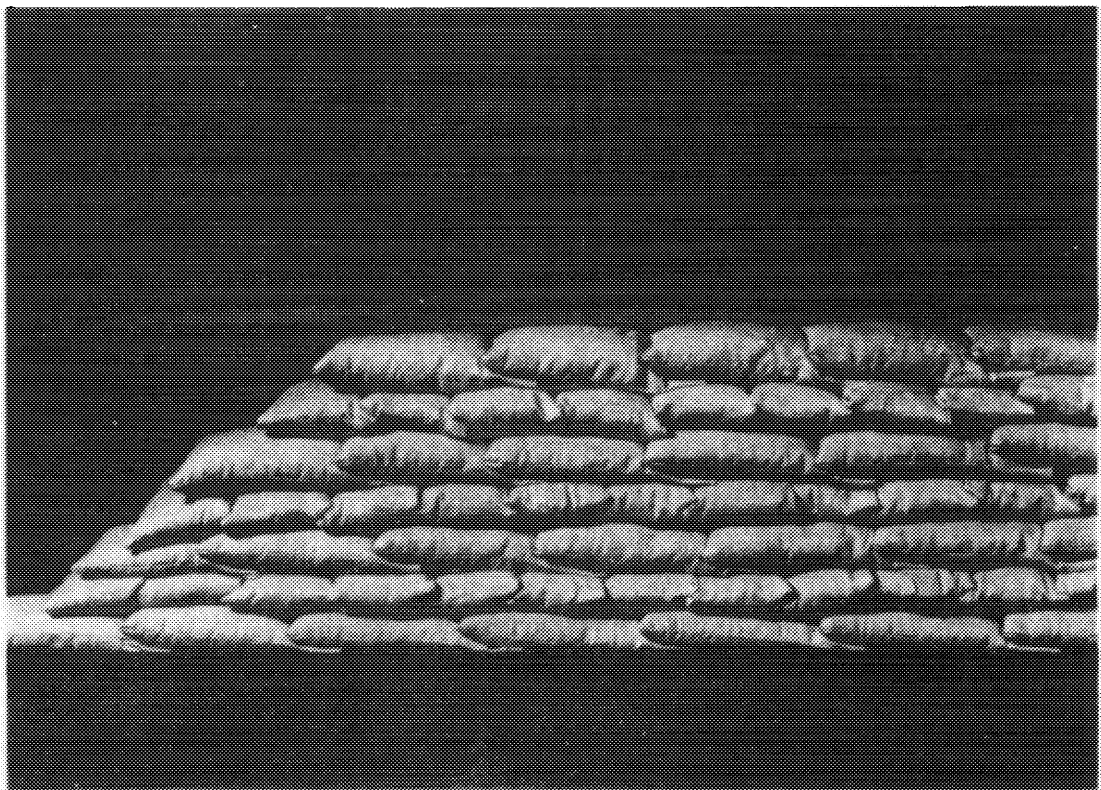
SACK DIKE OR TOPPING STANDARD HIGH WATER MAINTENANCE INSTRUCTION

FLOOD EMERGENCY MOBILIZATION PLAN

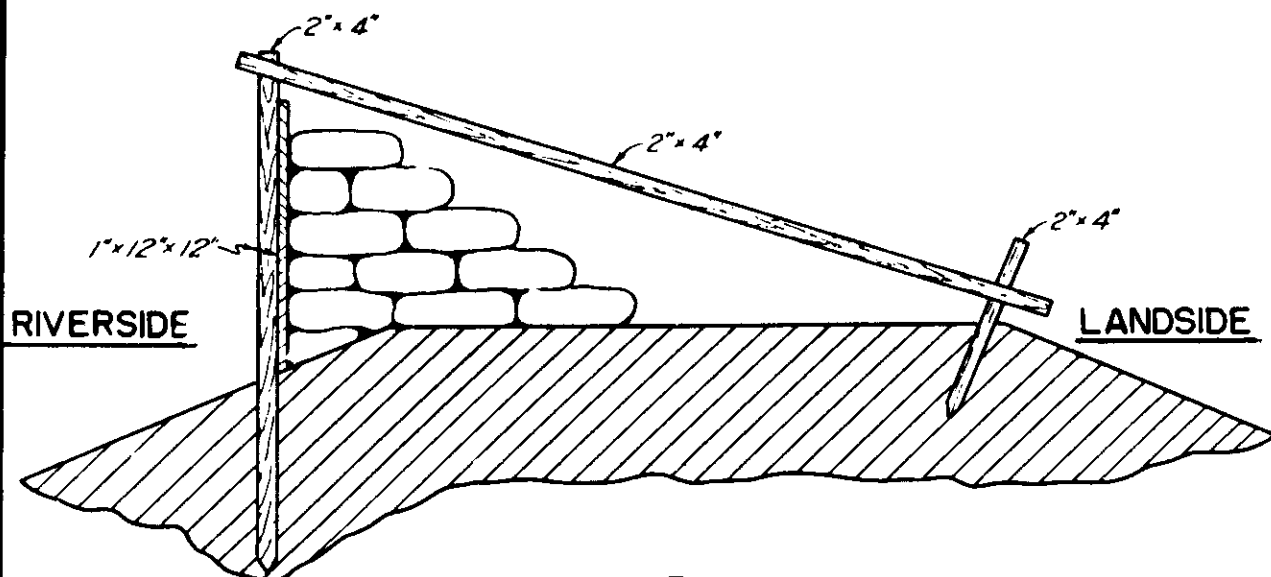
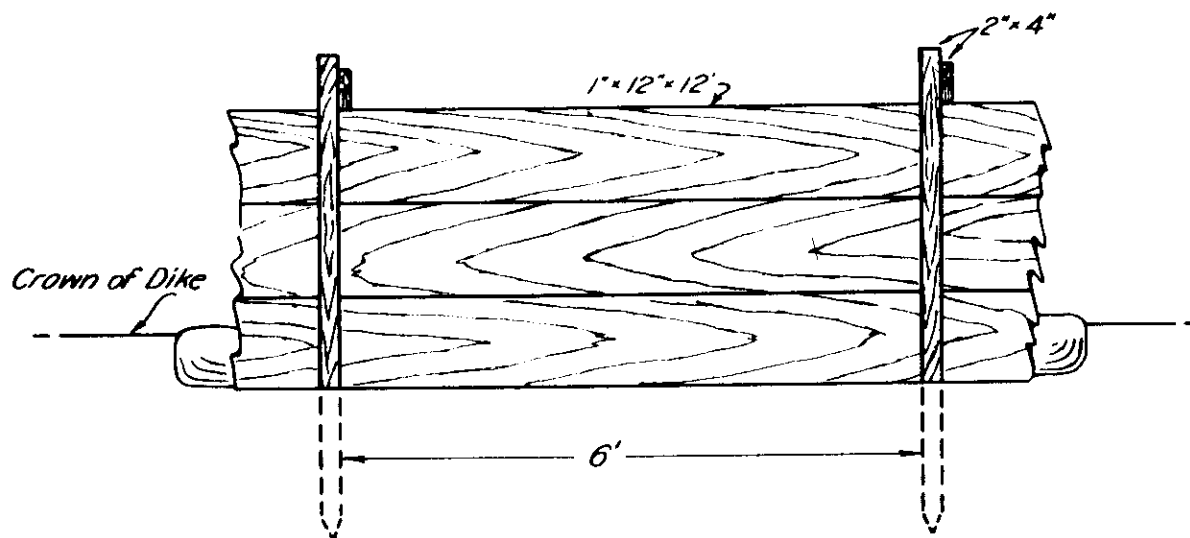
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NEW ENGLAND DIVISION, BOSTON, MASS.



MODEL SACK DIKE OR TOPPING
Typical Section



MODEL SACK DIKE OR TOPPING
Riverside View

END VIEWFRONT ELEVATIONBILL OF MATERIAL TO CONSTRUCT 100 FEET

25 pcs. 1" x 12" x 12'

17 pcs. 2" x 4" x 6'

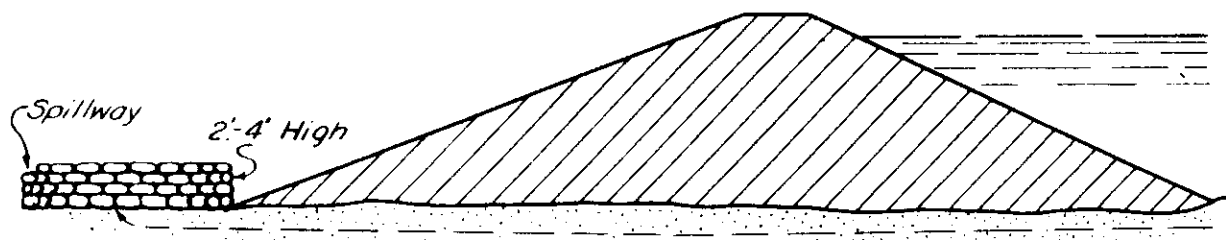
17 pcs. 2" x 4" x 10'

17 pcs. 2" x 4" x 2'

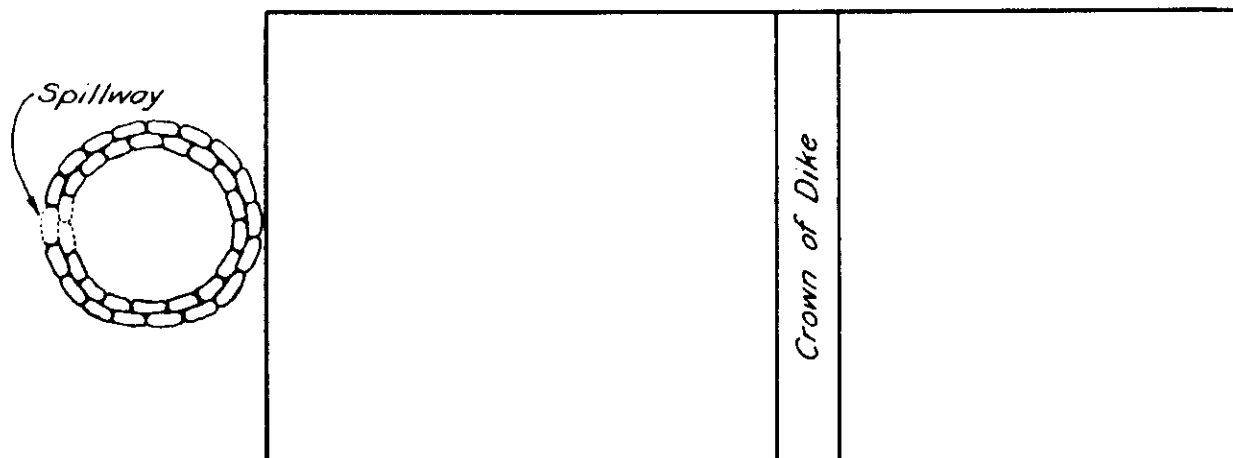
LUMBER AND SACK TOPPING STANDARD HIGH WATER MAINTENANCE INSTRUCTION

FLOOD EMERGENCY MOBILIZATION PLAN

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Wall should be built on firm ELEVATION foundation, with width of base at least $1\frac{1}{2}$ times the height. Be sure to place sacks on ground clear of sand discharge. Tie into dike if boil is near toe.



PLAN

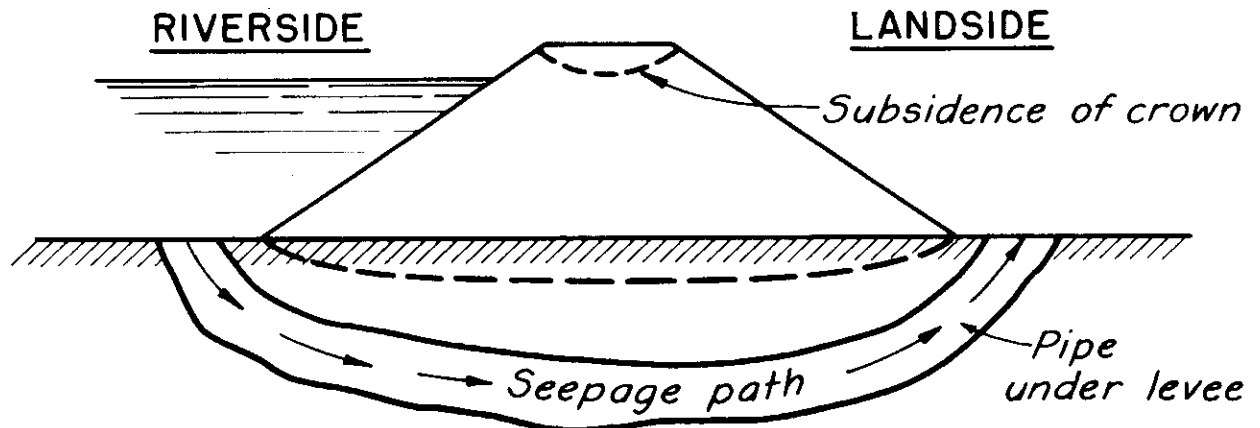
Do not sack boil which does not put out material. Height of sack loop or ring should be only sufficient to create enough head to slow down flow through boil so that no more material is displaced and boil runs clear. Do not try to stop fully, flow through boil.

SAND BOIL STANDARD HIGH WATER MAINTENANCE INSTRUCTION

FLOOD EMERGENCY MOBILIZATION PLAN

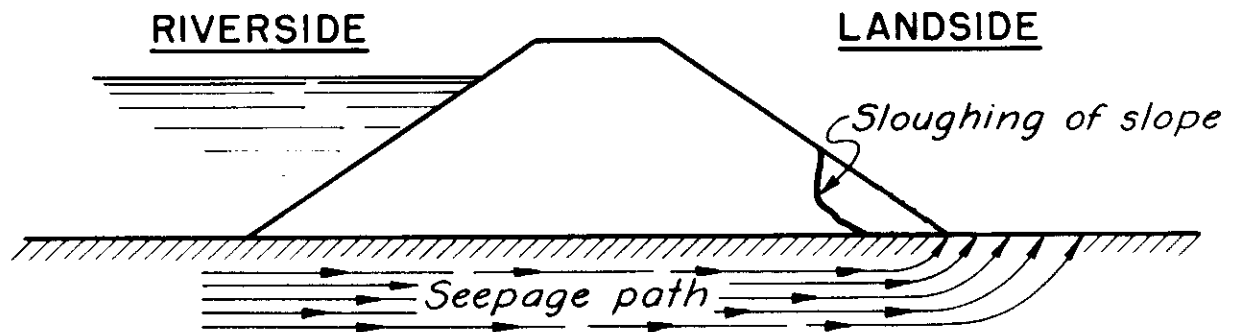
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EFFECTS OF SAND BOILS ON LEVEE



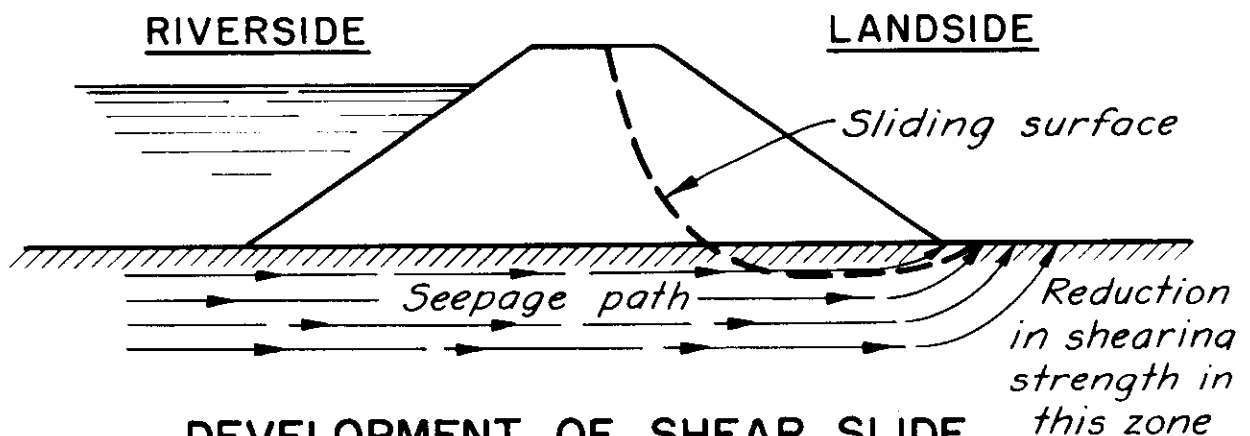
DEVELOPMENT OF PIPE UNDER LEVEE

Fig. 1



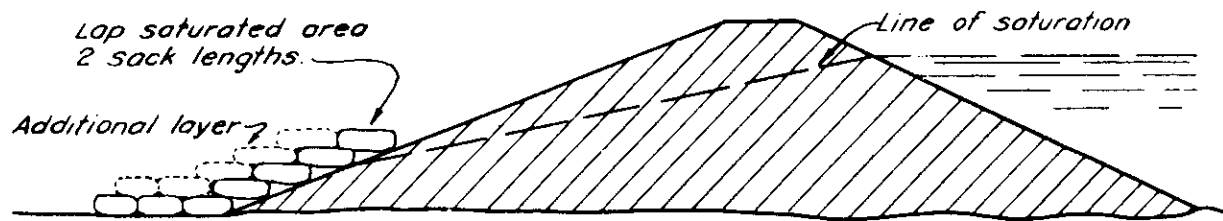
SLOUGHING OF LANDSLIDE SLOPE DUE TO RAVELLING AND UNDERCUTTING OF TOE

Fig. 2

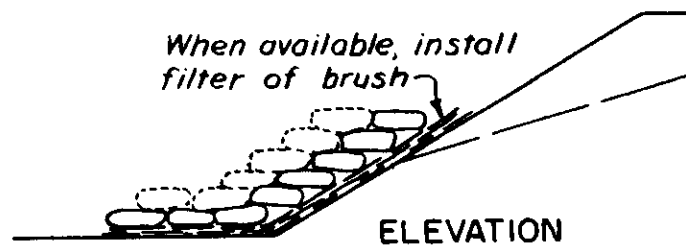


DEVELOPMENT OF SHEAR SLIDE

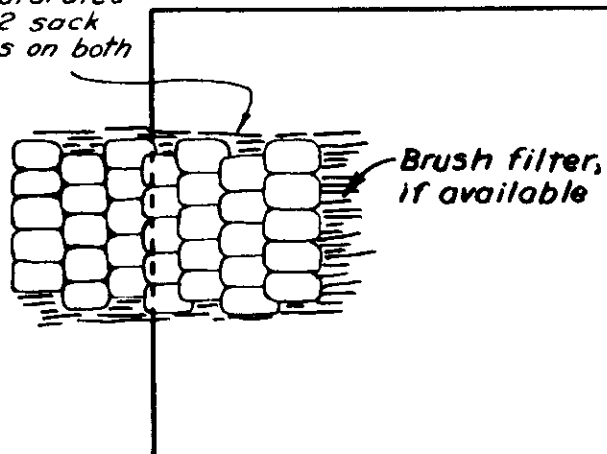
Fig. 3

ELEVATION

Number of layers determined by velocity of seepage and amount of material being carried

ELEVATION

Lap saturated area 2 sack widths on both ends.

PLAN

Sacks should be laid shingle fashion and not mounded into place.

SACKING SLOUGHS STANDARD HIGH WATER MAINTENANCE INSTRUCTION

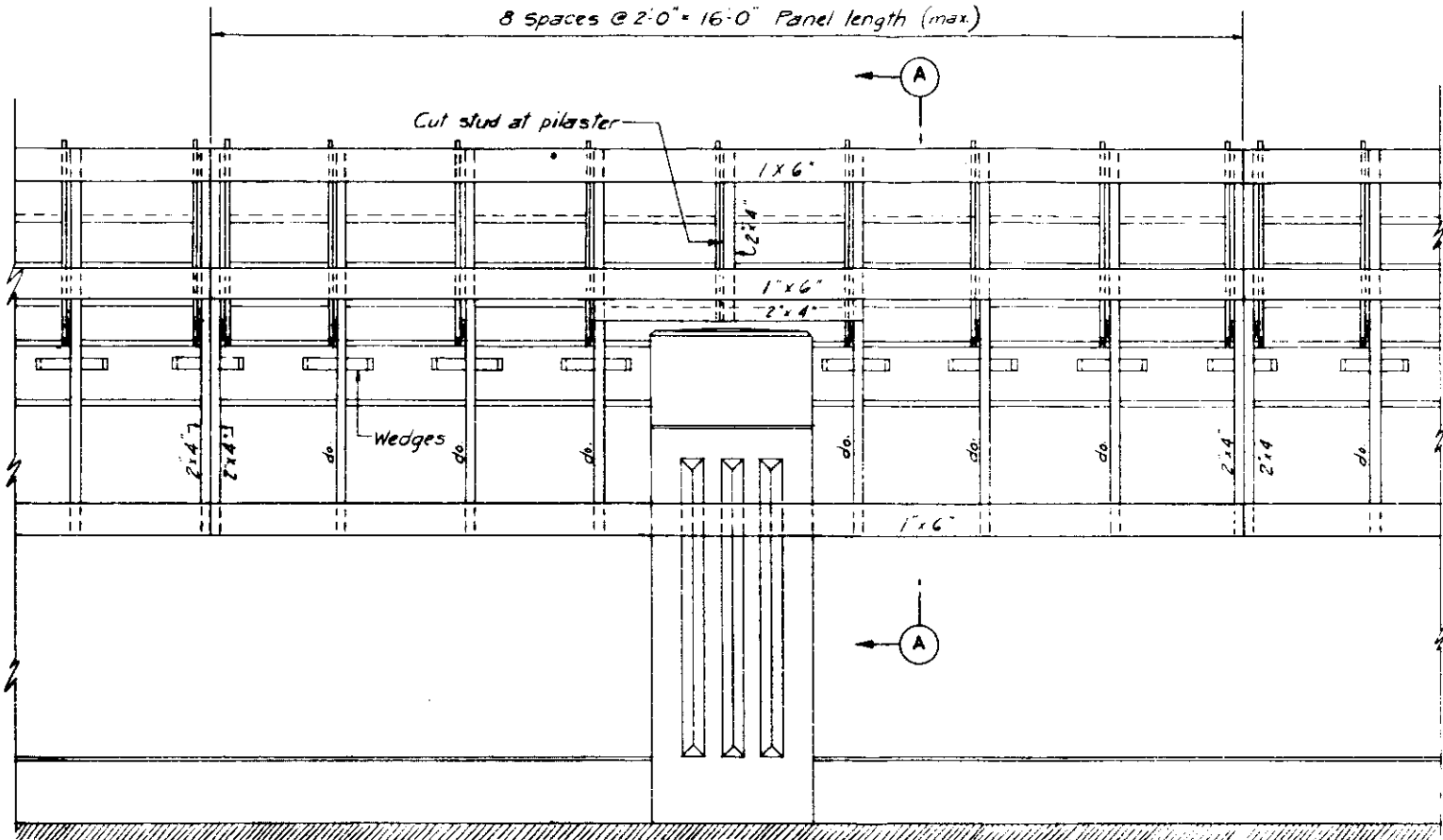
FLOOD EMERGENCY MOBILIZATION PLAN

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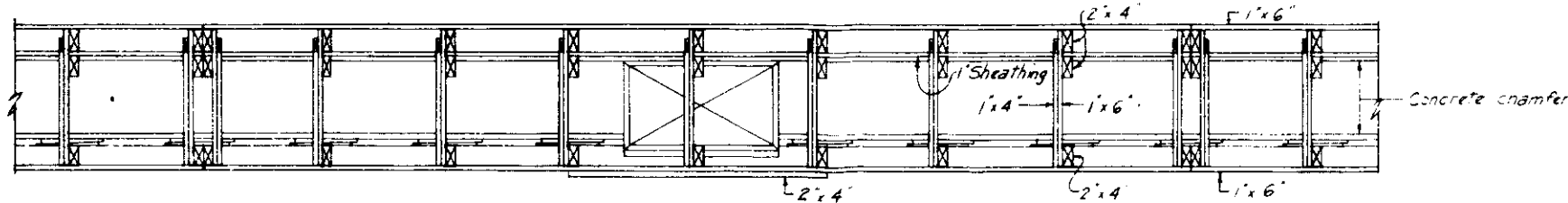
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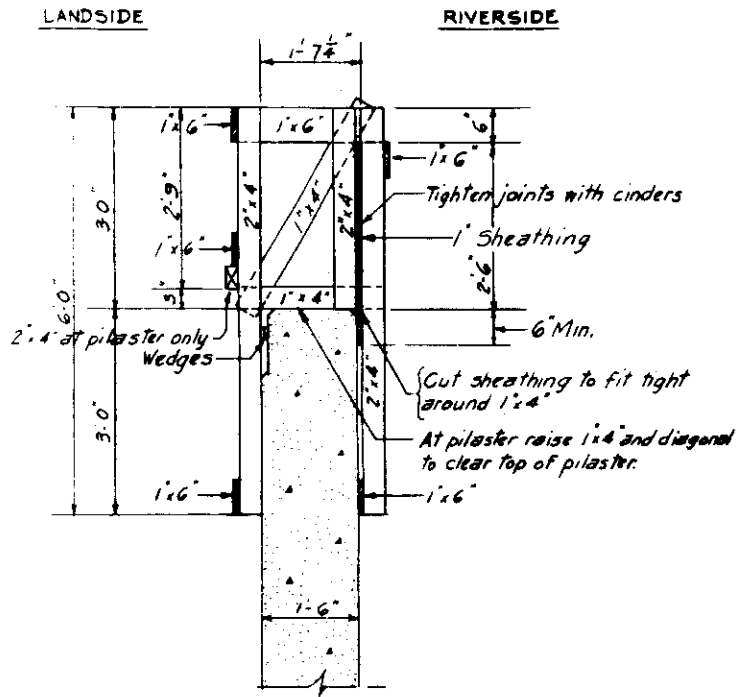
LANDSIDE ELEVATION



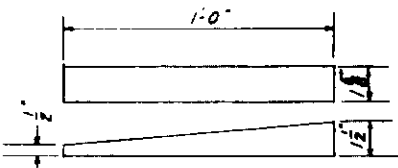
PLAN

BILL OF MATERIALS		
For one 8'-0" panel. Regular wall section.		
Uprights	10 pcs	2" x 4" x 6'-0"
Vert. brace	5 "	2" x 4" x 3'-0"
Stringers	5 "	1" x 6" x 8'-0"
Upper ties	5 "	1" x 6" x 2'-3"
Lower ties	5 "	1" x 4" x 2'-3"
Diagonals	5 "	1" x 4" x 3'-6"
Sheathing	6 "	1" x 6" x 8'-0" or random widths to make up 36'
Wedges	8	(1/2 to 1 1/2") x 2" x 1'-0" = 1-3" x 4'-0"

For one 8'-0" panel. Pilaster section		
Same as above list except:		
Substitute one upright 2" x 4" x 2'-9" for one 2" x 4" x 6'-0"		
Add one stringer piece 2" x 4" x 4'-2"		

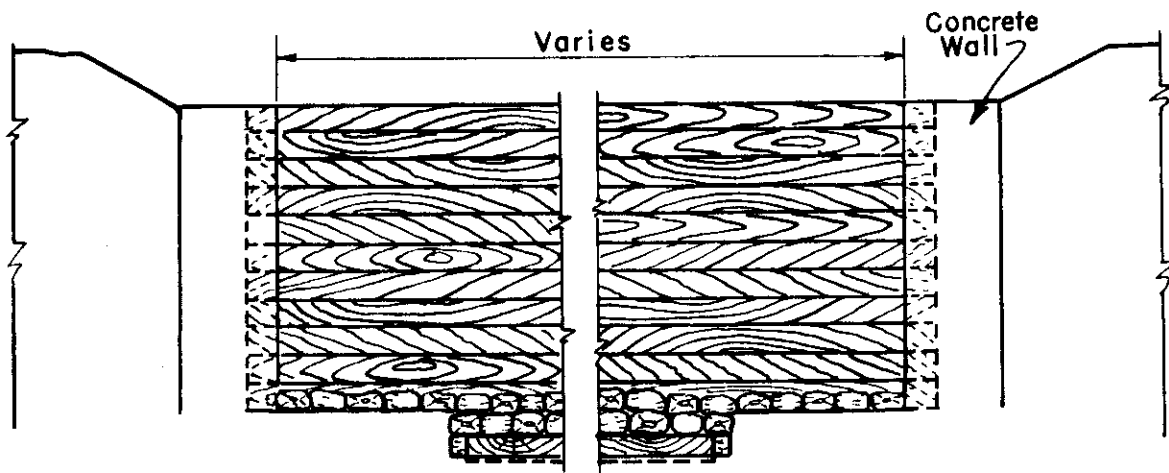


SECTION A-A

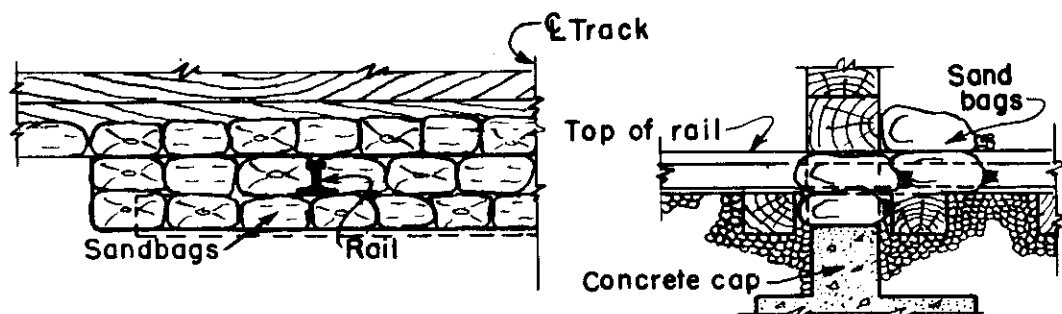


WEDGE

CONNECTICUT RIVER FLOOD CONTROL
EMERGENCY FLASH BOARDS
FOR FLOOD WALLS
CONNECTICUT RIVER MASSACHUSETTS
FLOOD EMERGENCY MOBILIZATION PLAN
PREPARED BY
CORPS OF ENGINEERS, U.S. ARMY
OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION, BOSTON, MASS.



ELEVATION VIEW R.R. STOP-LOG CLOSURE



DETAIL OF STOP LOG CLOSURE



DETAIL OF STOP LOG

NOTE:

Wedge top timbers in place to prevent floating.
Canvas or sisal craft paper should be tacked on river side face of timbers after erection to prevent excessive leakage.

**RAILROAD STOP-LOG DETAILS
FLOOD EMERGENCY MOBILIZATION PLAN**

PREPARED BY
CORPS OF ENGINEERS, U.S. ARMY
OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION, BOSTON, MASS.

FEBRUARY 1953

PART VI

EXTRACTS FROM ARMY REGULATIONS AND FROM ORDERS AND REGULATIONS OF THE CORPS OF ENGINEERS

A.R. 500-60 Emergency Employment of Army Resources

(2) Major Disaster. - Any disaster which is determined by the President to be of such severity and magnitude as to warrant assistance by the Federal Government under the provisions of Act 30 September 1950. --- This law provides that the governor of a State shall certify to the President the need for Federal assistance---.

2. RESPONSIBILITY. - a. General. - Responsibility for alleviation of disaster conditions is first of all the responsibility of the individual, or private industry, State and local government, and the American National Red Cross as defined in the act of 5 January 1905. ---.

(c) (1) Continental Army Commanders. - (a) Responsibility for operations in disaster relief under the provisions of these regulations is delegated to continental Army commanders.

(2) Corps of Engineers. - The prevention and control of floods is by statute the responsibility of the Corps of Engineers. When a flood of dangerous proportions is foreseen, District engineers will keep the Department of the Army and Army commanders informed of developments. The closest cooperation between District and Division Engineers, continental Army commanders, the Red Cross, and other relief agencies is necessary to mitigate the results of disastrous floods. Efforts incident to the repair, restoration, and maintenance of flood control works and the rescue of flood victims are performed by the Corps of Engineers. Army assistance in the relief of human suffering is the responsibility of the continental Army commander.

3. DEPARTMENT OF THE ARMY POLICIES. - a. Disaster relief will not be undertaken by the Department of the Army without the authority delegated by the Congress in act 30 September 1950 or by direction of the President, unless---

(1) The overruling demands of humanity compel immediate action to prevent starvation and extreme suffering in which event continental Army commanders will use personnel, supplies and equipment under their control within their own discretion, and advise the Department of the Army of action taken, and

(2) Local resources are clearly inadequate to cope with the situation in which event the relief measures to be undertaken will be those deemed necessary by the continental Army commander, subject to the provisions of these regulations. Local resources as here used comprise all resources available to the respective State and municipal authorities augmented by those available to the Red Cross in the affected areas.

b. When relief work is undertaken, the continental Army commander whose Army encompasses the affected area will assume control of all participation in the relief activities of the active Army. The Army commander is authorized to request commanders of class II installations (including general depots) in his area for such assistance as he deems necessary and practicable. Units, personnel, supplies and equipment made available by commanders of class II installations automatically pass to the continental Army commander in the event of disaster.

EXTRACTS FROM ORDERS AND REGULATIONS

4219.07 Interruption of Navigation

When accidents, break-down of machinery, floods, storm, or other emergencies require the suspension of navigation at locks, dams, and other works for a period estimated to exist 48 hours or more, a teletype report will be made to the Chief of Engineers of the circumstances causing suspension, remedial action being taken and estimated date for restoring the movement of navigation. Further report will be made upon resumption of navigation. The reports may be combined with other reports required in the case of general emergency conditions. (See paragraph 4216.20)

4219.09 Inspection of Navigation Works After Storms and Floods

In addition to any regular periodic inspection of navigation structures, District Engineers will insure that all works are inspected promptly after severe storms and floods and will report in the next following monthly report of operations the extent of damages, amount of impairment to the usefulness of the works, proposed further observation, etc. This applies particularly to revetment, contraction works, jetties, beach-erosion structures, groins, seawalls, breakwaters, and navigation structures where no personnel are in attendance or where periodic inspections of similar nature may be infrequent. When serious deterioration or structure movement impends, regular periodic observations and measurements will be made and records kept thereof. Recommendations for remedial action will be made to the Chief of Engineers sufficiently in advance to allow for provision of funds.

EXTRACTS FROM ORDERS AND REGULATIONS (CONT.)

4216.20 Procedures during emergencies

a. Authority for use of Government plant in emergencies is outlined in paragraph 4227.12.

b. The occurrence of and developments during incidents involving or likely to involve the Corps of Engineers as a technical service of the Department of the Army, functioning under Army commander control in conformance with the provisions of AR 500-60 and AR 500-50, will be reported by District Engineers as outlined below. Such incidents will include: major accidents of an unusual nature, riots, disasters arising or likely to arise from fires, hurricanes, tornados, earthquakes, etc.; and other events of national interest. With respect to flood emergencies, reporting requirements are outlined in paragraph 4223.05. Instructions for reporting on major incidents other than flood emergencies are as follows:

(1) The most expeditious means of communication available (telephone, wire, radio) will be used to report directly to the Army commander concerned, as the action addressee, a summary of events, brief of any action taken, an estimate of the situation, and any recommendations. Information reports will be furnished to the Division Engineer, and the Chief of Engineers, Attention: ENGKW; if such report to the Chief of Engineers is by telephone, the call will be made during working hours to the Assistant Chief of Engineers for Civil Works, and during non-working hours to the OCE duty officer in the Office of the Chief of Engineers, whose whereabouts is always known to the Department of Defense switchboard operator (telephone number Liberty 5-6700).

(2) Initial reports by wire or radio should be assigned "Operational Immediate" precedence designation. After the initial report subsequent messages will have precedence as warranted by the situation (see par. 7, SR 105-25 2). Confirmation of initial telephone messages to the Chief of Engineers will have "Priority" precedence. If copies of messages addressed to the Army commander concerned are used for information reports to be furnished the Division Engineer and the Chief of Engineers, the latter officers shall be listed as secondary addressees and not designated merely to receive information copies.

c. Requirements and procedures during flood emergencies are outlined in Section 23.

d. Procedures and reports in connection with interruption to navigation or emergencies affecting navigation are given in section 19.

e. In the event of hurricanes or other severe storms causing substantial damage to beaches and shore protection and river and harbor

EXTRACTS FROM ORDERS AND REGULATIONS (CONT.)

works, District Engineers will submit through the Division Engineers as soon as practicable after a storm occurs, a resume report including a general locality map and photographs of important damages. Two copies of such reports will be furnished the Chief of Engineers, one of which will be delivered by the Chief of Engineers to the Beach Erosion Board.

4223.01 Statutory Authorities

a. The Flood Control Act approved 18 August 1941, as amended by the Flood Control Acts of 1946 and 1948 and by Section 210 of the Flood Control Act of 1950 (Public Law 516, 81st Congress) constitutes the statutory authority for flood emergency operations by the Corps other than those discussed below in paragraph 4223.01b. Section 210 of the Flood Control Act of 1950 states that: "there is hereby authorized an emergency fund in the amount of \$15,000,000 to be expended in rescue work or in the repair, restoration or maintenance of any flood control work threatened or destroyed by flood, including the strengthening, raising, extending or other modification thereof as may be necessary in the discretion of the Chief of Engineers for the adequate functioning of the work for flood control. The appropriation of such moneys as may be necessary for the initial establishment of this fund and for its replenishment on an annual basis, is hereby authorized: Provided, That pending the appropriation of said sum, the Secretary of the Army may allot, from existing flood control appropriations, such sums as may be necessary for the immediate prosecution of work herein authorized, such appropriations to be reimbursed from the appropriation herein authorized when made: And provided further, That the Chief of Engineers is authorized, in the prosecution of work in connection with rescue operations, or in conducting other flood emergency work, to acquire on a rental basis such motor vehicles including passenger cars and busses as in his discretion are deemed necessary."

b. In connection with the project for the alluvial valley of the Lower Mississippi River, section 7 of the Flood Control Act approved 15 May 1928, reenacted in section 9 of the Act approved 15 June 1936, permits funds specifically appropriated for this purpose to be allocated by the Secretary of the Army on the recommendation of the Chief of Engineers for rescue work or in the repair or maintenance of any flood control work on any tributary of the Mississippi River threatened or destroyed by flood.

4223.02 Flood Emergency Procedure

a. Flood emergency preparation: It will be the duty of Division and District Engineers to prepare adequately for flood emergencies in the watersheds under their jurisdiction. Constant and positive action will be taken to maintain the Corps of Engineers' position of leadership

EXTRACTS FROM ORDERS AND REGULATIONS (CONT.)

in flood emergency planning. Pre-flood preparation by Division and District Engineers will include, but not be limited to, the following procedures:

(1) Keeping on a current basis the Flood Emergency Manual (see par. 4223.06, and making arrangements for prompt effectuation thereof, including familiarization therewith on the part of personnel of the Corps of Engineers.

(2) Enlisting maximum cooperation and participation on the part of local interests, and making arrangements for the closest cooperation between Division and District Engineers and continental Army commanders, the Federal Civil Defense Administration, the Red Cross, and other relief and rescue agencies, in order to mitigate the results of disastrous floods; assisting in every way to insure that the responsibilities of all agencies are mutually understood and that exchange of information and cooperation during emergencies are facilitated.

(3) Instituting necessary measures to keep currently informed of flood potential, as when snow-melt is liable to cause or materially contribute toward floods, concurrently informing the Chief of Engineers of any situations which indicate the possibility of dangerous stream flow in the event of a rapid thaw, and of other factors causing flood potential.

(4) Assuring that flood protection works will function with all possible effectiveness as follows:

(a) Continuing effort will be made to obtain proper maintenance by local interests of their flood protection works (see Sec 21, Part II, Chap. IV), and to encourage adequate advance preparation on their part for emergency flood operations. Such preparation will include stockpiling or otherwise providing for sandbags and/or other materials, and training of personnel, stressing their familiarization with operation and maintenance manuals or other forms of operation and maintenance instructions. (See Sec 21, Part II, Chap IV).

(b) In accordance with the above, periodic inspections will be made, supplemented by additional inspections as required, followed by direction of the attention of local interests to potential weaknesses in their flood protection works and in operation and maintenance procedures, and by recommendations to local interests relative to remedial measures. In the scheduling of inspections, opportunities for economies, through coordination of inspections with other flood control work, will be utilized to the utmost.

EXTRACTS FROM ORDERS AND REGULATIONS (CONT.)

(c) Steps will be taken to insure that flood control storage space will be available as required in reservoirs subject to regulation by the Corps of Engineers.

b. Procedure during flood emergencies.

(1) In time of flood, District Engineers will proceed as outlined below (see also par. 4216.20):

(a) Keep higher authority advised. (See Par. 4223.05).

(b) Provide local interests with such information on flood forecasts as is furnished by the Weather Bureau of the U. S. Department of Commerce (officially responsible for issuing flood warnings), supplemented by available additional pertinent information and by technical advice to enable local interests, within the limits of their capabilities, to obtain maximum flood protection and perform rescue and relief functions.

(c) Insure that flood control works are properly operated and maintained during the flood emergency, with special attention being paid to such activities and features as sandbagging and otherwise closing levee gaps or raising levee heights, operation of pumping plants, interior drainage facilities, and access facilities to flood control works. This requirement applies to all flood control works constructed with Federal funds, and also to any works constructed with non-Federal funds if the operation and maintenance of such works are in any way interrelated to the operation and maintenance of works Federally constructed.

(d) Take measures necessary to protect and preserve installations and property of the Corps of Engineers.

(e) Collect and report engineering data on conditions before, during, and after the flood. (See par 4223.05).

(f) Maintain adequate records of day-to-day flood fighting operations and of significant occurrences.

(g) Initiate action necessary for rehabilitation of installations and property of the Corps of Engineers.

(2) Supplementation of resources of local interests: The resources of the Corps of Engineers will be used as outlined above for direct rescue and flood fighting work, and may be used to supplement the rescue and flood fighting work of other agencies when humanitarian considerations require it, and when the local authorities normally responsible are unable to cope with the situation. If, in that event, pursuant

EXTRACTS FROM ORDERS AND REGULATIONS (CONT.)

to request by the local authorities, a Division or District Engineer assumes full responsibility for directing the flood fighting operations, the respective responsibilities of all agencies concerned must be clearly defined and mutually understood. (See pars 4101.13h, 4102.04c, 4227.12, 4227.15, and 7205.05). The following additional instructions are applicable to procurement of sandbags and issue of sandbags and other material to local interests for flood fighting:

(a) Procurement of sandbags: District Engineers will make every effort to fill sandbag requirements for flood fighting by the purchase of used bags, and to conserve the use of new bags to the maximum practicable extent. However, precaution will be taken against deterioration of stocks through excessive period of storage. Invitations for bids for new sandbags should provide an alternate bidding schedule to allow the receipt of bids from cotton manufacturers as provided for in Federal Specification MIL-B-12233 (CE).

(b) General Reserve of Sandbags: The Chief of Engineers maintains a general reserve of new civil works sandbags in storage at Granite City Engineer Depot and in certain military depots, insofar as military requirements permit, to supplement available local stocks in the event of a major flood emergency. If required, information on the location and quantities of sandbags in this general reserve may be obtained by direct inquiry to the Engineer Supply Control Office, St. Louis, Missouri. Sandbags should be requisitioned from the general reserve only to the extent required to meet essential needs, at times of extraordinary flood emergency, when local supplies of both used and new bags including districts' reserve stocks are inadequate to wage a successful flood fight. General reserve sandbags will not be requisitioned, without the prior approval of the Chief of Engineers, for the purpose of building up a district's reserve stock of sandbags for possible future need. Unbroken bales of sandbags requisitioned from the general reserve which are not used in the emergency will be returned to depot stock, at which time they will be accompanied by request for credit to the civil works general reserve account. Military sandbags in storage at any military depot, when available from issuable stock, may be requisitioned for flood fighting (see par 4101.13h), if no civil works bags comprising part of the general reserve are available at that location and the need is urgent.

(c) Issue to local interests of sandbags and/or other material: Issuance of sandbags or other material to local interests is authorized only for imminent or actual flood emergency use, and will be predicated on use by local interests of their maximum resources. All costs incurred by local interests in flood fighting operations will be borne by local interests, and no reimbursement therefor will be made by the Corps of Engineers. Stocks will be issued to local interests subject to return of any portions not so used, and after use will be salvaged

EXTRACTS FROM ORDERS AND REGULATIONS (CONT.)

or replaced in kind or paid for by local interests, to the extent considered feasible and practicable by the District Engineer.

c. Flood Disaster Procedure:

(1) Disaster operations pursuant to Public Law 875, 81st Congress approved 30 September 1950, are supplementary to and not in lieu of procedures and actions pursuant to any other law. Authority for Division and District Engineers to participate in furnishing flood disaster assistance beyond the statutory authority of the Corps of Engineers will emanate from the Continental Army commanders in accordance with the provisions of AR 500-60 and SR 500-60-5.

(2) Continuing liaison will be maintained by Division Engineers with the Regional Directors of the Federal Civil Defense Administration, whose territory encompasses areas within watersheds under their jurisdiction, on all mutual problems concerning flood control. Current information will be maintained regarding the regional organization and operating procedures of FCDA. The regional directors will be furnished copies of the Flood Emergency Manuals (SOP) of the Division and District Engineers. In notifying regional directors of existing or threatening flood situations as defined below, attention is directed to the reporting requirements in paragraphs 4216.20b, 4223.05e, and 4223.05g. For an orderly exchange of information between field offices of FCDA and the Corps, the procedures outlined below will be followed:

(a) Division Engineers will inform those regional directors concerned with watersheds under their jurisdiction of existing or threatening flood situations considered to be of such magnitude as may result in Federal agency action within the purview of coordinating action of FCDA as directed by Sections 1 and 4 of Executive Order No. 10427.

(b) Regional directors will inform Division Engineers of any existing or contemplated course of action within their jurisdiction affecting the statutory or policy responsibilities of the Corps of Engineers.

(c) Division Engineers will inform the regional directors whenever a flood emergency field headquarters has been established or plans for flood emergency operations have been activated in a district office.

(d) Regional directors will inform Division Engineers whenever a flood emergency field headquarters is established by FCDA for operation in a disaster which may affect the responsibilities of the Corps.

EXTRACTS FROM ORDERS AND REGULATIONS (CONT.)

4223.03 Funding of Flood Emergency Activities

a. During the existence of actual flood emergencies, Division and District Engineers are authorized to obligate up to \$10,000 from available funds, with reimbursement requested of the Chief of Engineers after the fact. In the event that expenditures are expected to exceed \$10,000, a teletype request for allotment of the necessary funds will be submitted to the Chief of Engineers. Allotment of funds for post-flood repairs to damaged flood control works is discussed in paragraph 4223.04c.

b. The costs incurred in connection with advance preparation for flood emergencies, and in connection with flood fighting and rescue work, and post-flood activities, are chargeable to accounts as follows: (See Programming and Accounting Manual, Civil Activities).

(1) General Investigations, (Miscellaneous Studies).

(a) Flood Emergency Studies. (Costs in connection with preparation, revision, and dissemination of Flood Emergency Manuals).

(b) Flood Investigations. (Collection and reporting of precipitation, flood stage, discharge, flood damage, and similar data of a hydrologic nature, not chargeable to survey or reconnaissance reports specifically directed by Congress or not directly related to actual emergency operations, as defined below, for which funds are specifically allotted).

(2) Operation and Maintenance, General (Emergency Operations).

Flood Control Emergencies-Repair, and Flood Fighting and Rescue Work (Costs in connection with the repair and rehabilitation of flood control works, and for measures required during a flood period in connection with preparation for an imminent flood fight and in connection with flood fighting and rescue work).

(3) General Expense. - Special investigations and reporting on flood situations as a result of inquiry initiated by Congress, or other sources outside the Corps of Engineers, not chargeable to the accounts shown above will be charged to "Miscellaneous Investigations" under the appropriation title, "General Expense."

4223.04 Procedure in connection with post-flood repairs to damaged flood control works.

a. General considerations. Repair of flood-damaged flood control works should normally be such as to provide the same degree of effective flood protection as provided by the original structures. It is the

EXTRACTS FROM ORDERS AND REGULATIONS (CONT.)

general policy of the Chief of Engineers that betterments be limited to those of a minor nature and undertaken only in connection with restoration work. In lieu of repairing the existing flood control works, alternate methods for providing equivalent flood protection may be employed, provided the estimated costs under such procedures are not in excess of those for the rehabilitation of the damaged works along the original alignment.

b. Investigation and reporting. Upon receipt of a specific request, the District Engineer will proceed with such investigations as may be necessary to determine the feasibility of undertaking emergency repair work. Reports proposing emergency work, together with the comments and recommendations of the Division Engineer, will be submitted to the Chief of Engineers in letter form. The report will include:

- (1) A plan of the proposed work.
- (2) An estimate of the cost.
- (3) Proposed local participation.
- (4) Analysis of benefits expected from such work.
- (5) Details on any betterments proposed.
- (6) An evaluation of past local maintenance.
- (7) A determination of the willingness and ability of local interests to provide adequate future maintenance.
- (8) A request for an allotment of necessary funds.

c. Review and allotment of funds. After the report is reviewed by the Chief of Engineers and it is determined that: (1) the proposed work can be accomplished under existing emergency authority; (2) it is sound from an engineering and economic standpoint, and (3) funds are available, the work will be approved subject to fulfillment of requirements for local cooperation and necessary funds will be allotted. Funds found surplus upon completion should be reported for revocation as soon as practicable after final costs have been determined.

d. Procedure under special authorizations. Should special emergency repair authorizations be enacted by Congress as a result of a major flood disaster, special instructions for procedure under such authority will be issued by the Chief of Engineers as deemed necessary.

EXTRACTS FROM ORDERS AND REGULATIONS (CONT.)

e. Assurances of local cooperation in connection with emergency repair work will be obtained in a manner similar to that set forth for local protection projects in section 21, part II, chapter IV. Local interests should be encouraged to participate in flood emergency repairs through contributions of work or equivalent cash, especially where benefits from the proposed project are primarily of a local nature. Contributed funds will be made available to the District Engineer prior to initiation of construction. Approval by the Chief of Engineers of the assurances tendered by local interests will not be required except where there are special or unusual conditions of local cooperation, as when the assurances are embodied in the form of an assurance contract. A single executed copy of assurances satisfactory to the Division and District Engineers will be forwarded to the Chief of Engineers (see par. 5209.02c).

f. Transfer of completed work to local interests. Completed emergency repair work will be transferred to local interests responsible for maintenance and operation, in accordance with the procedures for transfer of completed local flood protection projects (See section 21, part II, chapter IV). If considered adequate for the purpose, the District Engineer may furnish the local authorities, in lieu of an operation and maintenance manual, such instructions in briefer form as will cover the operation and maintenance requirements.

g. Records of local cooperation. Records will be maintained on ENG Form 1831.

4223.05 Reports Required During Floods (Exempt from Reports Control).

a. Category A floods: As referred to herein, Category A floods include all major floods, exclusive of relatively localized floods defined hereafter as Category B floods, in which extensive property damage occurs or serious danger to life or flood protective works prevails. Whenever a Category A flood is in progress or anticipated, District Engineers will submit daily reports to the Division Engineer and direct to the Chief of Engineers.

(1) These reports will be dispatched to the Chief of Engineers as early as practicable but not later than noon (local time). On working days, reports will be dispatched by teletype, with a precedence of "Priority" marked "Flood Report attention: ENGK," except that in special emergencies reports will be made by telephone to the Assistant Chief of Engineers for Civil Works. Teletypes to the Chief of Engineers will be sent by commercial service to station ARLINGTON 500 if facilities are available. During non-working hours flood reports will be made by telephone to the duty officer in the Office of the Chief of Engineers unless otherwise specifically instructed by the Chief of Engineers. Summary

EXTRACTS FROM ORDERS AND REGULATIONS (CONT.)

teletype will be submitted on the first following work day. On Saturdays, Sundays, and holidays, reports by telephone will be made only in the event of significant changes in flood conditions as previously reported, or the occurrence of major flooding or other development of serious proportions, resulting or likely to result in heavy loss of life and/or property damage.

(2) Whenever reports are being submitted by two or more districts in one division, the Division Engineer will examine the flood reports and dispatch supplementary reports when important information has been omitted or where necessary information concerning coordination of data or operations has not been furnished.

(3) During critical phases of a Category A flood, reports will consist of a summary of the general situation, tabulation of river-stage data at representative stations, and tabulations of pertinent data on reservoirs that affect or may affect flood conditions. The summary will include general information on flood conditions, including lives lost; levee breaks; acres flooded, with preliminary damage estimates; preliminary damage estimates to major industries, railways and highways, pipe lines, public utilities, communication facilities, Federal property and flood control structures; military installations or important production facilities endangered or flooded; railroads or major highways out of service; brief information covering activities of the Corps of Engineers, other Federal agencies, State, municipal or local agencies and charitable organizations; date and extent of emergencies declared by Governors; and use of National Guard and Federal troops, if called. The tabulation of river stage data will include name of stream; location of gage; flood stage; stage at 0800 (or other standard morning observation time); predicted crest stage and date of predicted crest; and maximum stage of record and date. The tabulation of reservoir data will include name of reservoir, reservoir stage, predicted maximum stage and anticipated date, rate of inflow and outflow in c.f.s., percent of flood control storage utilized to date, and any special information particularly pertinent to the flood situation. In order to condense teletype reports, the tabular data referred to above that is not dependent upon daily observations may be furnished the Chief of Engineers in advance by letter for selected key stations, and subsequently omitted from teletype reports pertaining to those stations.

(4) During periods when serious flooding is actually occurring or is anticipated in a given basin, supplementary reports will be likewise submitted at the close of business each day, summarizing all significant changes during the day or stating that no important changes have occurred. Daily reports will be based on such data as can be assembled through facilities normally available to Division and District Engineers, and, during extraordinary floods, by special field reconnaissance insofar as practicable.

EXTRACTS FROM ORDERS AND REGULATIONS (CONT.)

(5) After the critical phase of a flood has passed and stages have receded generally to a relatively non-dangerous stage, daily reports, as specified above, may be reduced in priority and scope. They should include a description of the flood situation in general terms, supplemented, as required for clarity, by selected representative river-stage and reservoir-stage data. River-stage data normally available on Weather Bureau teletype, Schedule "C", "CR" sequence, may be omitted from reports submitted during the later recession phases of floods, but during critical flood periods daily reports should be adequately self-contained, inasmuch as the desired data are not always available from Weather Bureau teletype reports.

b. Category B floods: For reporting purposes, "Category B" floods will be considered to include so-called "flash floods" as well as all other relatively localized short duration floods (cresting time after heavy rainfall, less than approximately 12 to 18 hours) that produce high property damage or hazard to life in local areas without creating or contributing substantially to dangerous flooding along larger rivers downstream. In general terms, Category B applies to severe floods of such local extent as to preclude submission of emergency flood reports to the Chief of Engineers before critical phases of flooding have passed. As soon as practicable after occurrence of a Category B flood, a teletype report will be dispatched by the District Engineer concerned direct to the Chief of Engineers in the manner specified in a above. Category B floods will be reported on Saturdays, Sundays and holidays in the same manner as Category A floods. Such reports will be made only when exceptionally severe property damage or loss of life is suffered; otherwise teletype reports will be dispatched to reach the Chief of Engineers as early as possible on the first working day following. The initial report will present a summary generally similar to that prescribed for Category A floods, based on information obtainable from all available sources. Subsequent reports will be submitted as required to present a reasonably accurate account of the extent and noteworthy effects of the flood.

c. Category C Floods: Flows approaching flood stage in relatively large drainage areas without having directly caused loss of life or significant property damage, but creating conditions especially favorable for a major flood in the event of further heavy rainfall or snow melt or both, will be classified as "Category C floods." When such conditions prevail in a drainage basin tributary to a river already above critical flood stage, teletype reports summarizing conditions will be dispatched daily, on regular working days only, in the general manner prescribed in a above. In the case of streams characterized by very slow or sluggish runoff, where stages usually remain above official flood stages for long periods during flood seasons without constituting an unusual flood hazard to downstream areas, daily teletype reports will not be required, but reports should be forwarded at such intervals as the responsible Division or District Engineer considers necessary to keep the Chief of Engineers informed of streamflow conditions

EXTRACTS FROM ORDERS AND REGULATIONS (CONT.)

that might reasonably develop into serious floods. In preparing reports pertaining to Category C floods, it may be assumed that the Chief of Engineers has access to data normally transmitted over Weather Bureau teletype Schedule "C".

d. Collection of Data: Upon the occurrence of Category A or B floods, District Engineers will take action to insure the collection of all hydrologic information, estimates of damage, and other engineering data that would be of value in connection with flood control studies or in the review of possible claims against the United States for damages. As soon as practicable after the flood, a report will be forwarded to the Chief of Engineers covering the general situation, with a presentation of principal supporting information and complete bibliography of the pertinent data collected and filed in the district office. This report, or a separate supplement thereto submitted as soon as practicable thereafter, will include an evaluation of the stage reduction effected at key stations by flood control or multiple-purpose reservoirs (singly and combined) operated by the Corps of Engineers, or by other agencies under the provisions of section 7 of the Flood Control Act of 22 December 1944. Whenever practicable, estimates of flood losses prevented by projects in operation should be submitted with final reports on Category A and B floods. A special report of such data should be submitted for Category C floods, if applicable.

e. Storm studies: In the event of storms of major flood producing potentialities, District Engineers will initiate the preparation of a preliminary storm study as described in chapter 6, part CXIV of the Engineering Manual for Civil Works, including thorough investigation of unofficial observations that have an important bearing on rainfall and runoff determinations, and will forward such report to the Chief of Engineers with recommendations regarding the advisability of further studies as soon as practicable after occurrence of the storm; if specifically directed by the Chief of Engineers, a final storm study will be prepared in accordance with established procedure.

f. Notification in connection with disastrous floods: Division Engineers will notify the Chief of Engineers by the quickest possible means whenever any flood is, or threatens to be, of sufficient severity and magnitude to warrant assistance by the Federal Government under the provisions of the Act of Congress approved 30 September 1950 (Public Law 875, 81st Congress). This notification will include information on whether the Governor of any state concerned has certified, or intends to certify, the need for disaster assistance. Similar notification will be given to those Army Commanders and Regional Directors of the Federal Civil Defense Administration who are concerned.

EXTRACTS FROM ORDERS AND REGULATIONS (CONT.)

g. Reports to Army Commanders and Federal Civil Defense Administration: In accordance with provisions of AR 500-60 pertaining to reports of catastrophes, and current instructions dealing with the subject, District Engineers will keep the Army Commanders concerned informed by wire as to developments during floods when conditions so warrant (see par 4223.02). The Chief of Engineers will keep the Assistant Chief of Staff, G-3, informed as to developments during floods, as prescribed in paragraph 2c(2)(b), AR 500-60.

4223.06 Flood Emergency Manual

a. Division and District Engineers will prepare and distribute within their organizations and to any affected agencies, a flood emergency manual in which will be outlined the responsibilities and procedures of their organizations before, during, and after flood periods. This manual will be revised at least once each year. Two copies of each manual will be furnished to the Chief of Engineers promptly upon issuance. The principles and organization outlined in the manual should be utilized to the extent applicable for emergencies other than floods.

b. In general, the flood emergency manual will contain a definition of the conditions under which the manual becomes operative, the functions to be performed by the Corps of Engineers during floods and the organizational assignments of personnel to accomplish those functions. The functions of organizations other than the Corps of Engineers, such as the Weather Bureau, Coast Guard, Red Cross, military organizations and local agencies concerned with activities during floods, will also be described and channels of liaison with those agencies defined. The manual will include basic data, forms, maps, and all information necessary to insure prompt and accurate action under emergency conditions.

4227.12 Use of Plant in Emergency to Save Life or Property

a. By authority of the Secretary of the Army, permission is given to Officers of the Corps of Engineers having charge of Government property to use or loan Government boats, barges, and other appliances, in case of sudden emergency not permitting request for previous authority, when life is endangered. Reimbursement for any expense incurred is not required when property is used to save life. The use of such plant is also permitted to save property, provided that no suitable private boats or appliances are available and that the plant can be spared without detriment to the Government works. When Government plant or appliances are used to save property, only "out of pocket" expense incurred by the United States should be billed to the owner of such property. The bill will not include plant rental, nor will it be increased 25 percent as is customary in loan or lease of plant to private parties as prescribed in paragraph 4227.17 and in instructions for use of Engineer Form 1356.

EXTRACTS FROM ORDERS AND REGULATIONS (CONT.)

b. Officers and crews of Corps of Engineers boats are authorized and required to proceed to the assistance of nearby vessels in distress and to attempt to save the lives of those endangered, provided the safety of Government plant and personnel is not unduly jeopardized thereby.

c. When necessary, and provided payment is reasonably assured, masters and others in charge of Corps of Engineers boats are authorized to issue sufficient fuel or supplies to privately owned boats to enable them to reach port.

d. Prompt report, with full statement of facts, will be made to the Chief of Engineers of all use or issue of Government property to save life or property.

4227.15 Use of Plant and Other Property and Facilities by States, Political Subdivisions, and Private Parties

It is the policy of the Chief of Engineers, that Government plant and other property and facilities will not be loaned or leased to States, political subdivisions thereof, or to private parties except where there is an urgent and essential need therefor and where all efforts have failed to obtain such plant or other facilities from private sources. This policy is not applicable to the use of plant in an emergency to save life or property as permitted by the provisions of paragraph 4227.12. The policy of the Chief of Engineers is motivated by the desire to avoid any semblance of competition or interference with the legitimate fields of enterprise of equipment dealers, contractors, etc., and the necessity for insuring that plant and other facilities will be immediately available in proper operating condition to meet emergencies on the projects for which the plant was acquired.

4101.13 (h) Requisitioning Channels and Procedures for Other Items.

(1) Requisitions for Military Supplies and Equipment in connection with disasters and flood emergencies will be processed in accordance with the procedures in AR 500-60.

(a) Requisitions on the Commanding Officers of Engineer Depots and Engineer Supply Officers of General Depots will be filled without reference to the Engineer Supply Control Office if the items are available from issuable stock. For items not on hand or available from issuable stock the depot will contact the Engineer Supply Control Office by the most expeditious means possible for completion of supply action. If it is determined that items are not available, the requesting Division or District Engineer will be informed immediately. If the unit cost of items issued is less than \$10, issue will be on a reimbursable

EXTRACTS FROM ORDERS AND REGULATIONS (CONT.)

basis with the District Engineer billed only for actual cost of the item or items and transportation charges. If the unit cost is \$10 or greater, the items will be supplied on a loan or return basis. "Out of pocket" expenses, i.e., transportation and handling costs and repair and rehabilitation costs will be billed by the depot to the District Engineer for reimbursement on Standard Form 1080, to the appropriations chargeable for each separate transaction. Shipment always will be made on a shipping document which will include the cost of the item or items involved.

(b) Requisitions made by Army Commanders to Commanding Officers of Engineer Depots and Engineer Supply Officers of General Depots will be honored for supply if items are available from issuable stock. For items not on hand or available from issuable stock, the depot will contact the Engineer Supply Control Office by the most expeditious means possible for completion of supply action. If it is determined that the items are not available, the requesting Army Commander will be informed immediately. Reports of all issues will be made to the Engineer Supply Control Office. Reimbursement for losses, handling and transportation costs, and repair and rehabilitation costs, will be processed by the depot to the Army Commander on Standard Form 1080. Shipment will always be made on a shipping document and will include the cost of the item or items involved.

(c) Division and District Engineers, Commanding Officers of Engineer Depots, and Engineer Supply Officers of General Depots receiving requisitions from local municipalities and state authorities for supplies and equipment to be used for assistance in the work of warning, rescue and evacuation incident to disasters and floods, will be referred to the Army Commander for action. In the event the emergency or disaster compels immediate action to prevent human distress and extreme suffering and if local resources are inadequate to cope with the situation and time does not permit reference to the Army Commander for prior approval, coordinated approval by telephone and supply of equipment will be effected to the municipal or State authority if the request has been properly channeled through the authorized state disaster agency. The Department of the Army agreement with the American National Red Cross, as set forth in AR 500-60 and SR 500-60-5 delineate responsibilities in connection with this type request. In any event, supply and processing of issues will be consistent with policies and procedures set forth in (a) and (b) above.

4102.04 (c) Employment of troops.

(1) General. - The regulations pertaining to employment of Engineer troops are contained in AR 100-10.

EXTRACTS FROM ORDERS AND REGULATIONS (CONT.)

(2) Flood fighting duty

(a) The following procedures are prescribed for planning for use of troops, aircraft, and signal communications with necessary supplies and equipment in connection with flood emergencies and for the execution of such plans. They are not intended to conflict with the responsibilities of major military commanders as prescribed by AR 500-50 and AR 500-60.

(b) The President, Mississippi River Commission, and Division Engineers of areas other than those under the jurisdiction of the President, Mississippi River Commission are authorized to establish direct communication, in connection with flood emergencies, with commanders of the appropriate armies and air forces for the purpose of obtaining necessary troops, signal communications, vehicles, construction equipment, supplies and aircraft for transportation and/or photographic reconnaissance.

(c) Commanders of appropriate armies and air forces are those commanders in whose areas the flood emergency occurs. In this connection, the President, Mississippi River Commission is authorized direct communication with the Commanding Generals, Second, Third, Fourth and Fifth Armies, and the Commanding Generals, Fourteenth Air Force.

(d) Request for additional troop assistance or for troop units directly under the control of the Chief of Engineers will be forwarded to the Chief of Engineers, Attention: ENGTO.

WAR DEPARTMENT
Office of the Chief of Engineers
Washington

ENGWFP

21 June 1946

SUBJECT: Operation of Local Flood Protection Projects

TO: The Division Engineer
New England Division
Boston, Massachusetts

1. The inadequacy of operation at certain completed local flood projects during recent floods has brought to the attention of this office the need for closer cooperation between the Department and local authorities charged with operation of those projects. Section 3 of the Flood Control Act of 1936 as amended places the responsibility for operation and maintenance of local protection projects, with certain exceptions, on local interests and the regular duties of the District Engineer with regard to projects completed and turned over to local interests are set forth in paragraph 4221.04 of Orders & Regulations. The satisfactory performance of completed local protection projects during times of flood, however, is of such importance to the Department as to warrant positive action to insure timely placing of stop-logs, assembling of flood fighting forces and materials, and initiation of flood fighting operations. Such action may include, in cooperation with local authorities, the operation of completed projects with Engineer Department forces and funds when local agencies normally responsible are unable to cope with the situation. The responsibilities of the District Engineer in flood fighting operations are clearly stated in paragraphs 4223.02, 4223.03 and 4223.06 of Orders and Regulations.

2. It is desired that during floods or when flood conditions are threatened District Engineers maintain close contact with local authorities at completed projects, beginning sufficiently in advance of damaging flood heights to permit assembling of flood fighting forces and materials. Positive action will be taken to warn local authorities of storm developments having flood producing potentialities. Inspections of completed projects called for in paragraph 4221.04 of Orders and Regulations will be sufficiently frequent to acquaint the District Engineer with the condition of the protective works and the ability of personnel charged with their operation and maintenance. In the event that the District Engineer considers the condition of the project works or the abilities of the operating personnel to be inadequate to meet emergency conditions, he will send a representative capable of directing the work to the project with authority to expend Engineer Department funds, if necessary, to insure proper operation.

BY ORDER OF THE CHIEF OF ENGINEERS:

P. A. FERINGA
Colonel, Corps of Engineers
Director of Civil Works

DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF ENGINEERS
WASHINGTON 25, D. C.

ENGOU 370.14

27 December 1948

SUBJECT: Assignment of Troops and Aircraft to Flood Fighting Duty

TO: Division Engineers, except Division Engineer, WOD
District Engineers, except District Engineers Grecian
and Panama Districts and districts in WOD
President, Mississippi River Commission

1. The following procedures are prescribed for use of troops, signal communications aircraft etc., in connection with levee protection and maintenance during flood emergencies. They are not intended to conflict with the responsibilities of major military commanders as prescribed by AR 500-50 and AR 500-60.

2. a. The President, Mississippi River Commission and Division Engineers of areas other than those under the jurisdiction of the President, Mississippi River Commission are authorized to establish direct communication, in connection with flood emergencies, with commanders of the appropriate armies and air forces for the purpose of obtaining necessary troops, signal communications, vehicles, construction equipment, supplies and aircraft for transportation and/or photographic reconnaissance.

b. Commanders of appropriate armies and air forces are those commanders in whose areas the flood emergency occurs. In this connection, the President, Mississippi River Commission is authorized direct communication with the Commanding Generals Second, Third, Fourth, and Fifth Armies, and Fourteenth, Ninth, Twelfth and Tenth Air Forces.

3. Request for additional assistance or for troop units directly under the control of the Chief of Engineers will be directed to the Chief of Engineers, attention: Operations and Training Division, Extension 73337.

4. Multiple letter ENGOU 370.14, 9 February 1948, subject, as above is rescinded.

BY ORDER OF THE CHIEF OF ENGINEERS:

/s/ Henry F. Hannis
HENRY F. HANNIS
Colonel, Corps of Engineers
Executive

February 1951

DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF ENGINEERS
WASHINGTON 25, D. C.

ENGBI

27 January 1949

SUBJECT: Arrangements for Flood Fighting Assistance

TO :	ENGINEER SUPPLY OFFICER:	COMMANDING OFFICER:
	Belle Mead General Depot	Granite City Engineer Depot
	Columbus General Depot	Marion Engineer Depot
	Richmond General Depot	Schenectady Gen. Depot (ATTN:ESO)
	San Antonio General Depot	Sharpe Gen. Depot (ATTN:ESO)
	Utah General Depot	

1. Reference:

a. Paragraph 4101.09 c (1), Change 3, dated 1 December 1947, to Part I, Chapter IV of Orders and Regulations, subject: "Issues to District Engineers for Flood and Other Emergency."

2. The purpose of this letter is to reaffirm the policy of this office to make military stocks of equipment and supplies available to division and district engineers in the event of flood emergencies, when the division engineer concerned finds that the emergency and the need exist.

3. Requests made to depots by division and district engineers for military supplies and equipment to be used during floods or other emergencies involving risk of life or property will be filled by the depots without reference to the Engineer Supply Control Office, Granite City, Illinois, the supply control point for the Office, Chief of Engineers, insofar as they are available from issuable accounts, including Account Code 15. If required items are not available in issuable accounts, the requisitioning office will be so advised without delay. If the unit cost of such items is less than ten dollars (\$10.00) items will be issued on a reimbursable basis using Civil Works funds. If the unit cost is ten dollars (\$10.00) or greater, items will be supplied on a loan or return basis. Losses, cost of handling, transportation and rehabilitation will be charged against Civil Work funds.

4. Reimbursement, when required, will be accomplished in accordance with the provisions of paragraph 5 of OCE Circular Letter 4019 (Fiscal No. 383), dated 21 November 1945, file SPEFB-113.2, subject: "Adjustment and Reimbursement Policies and Procedure." Form 1080 will be accomplished for each separate transaction.

5. Depots will maintain necessary records and follow-up to insure that items issued on a loan basis are returned to depot stock or disposed of in accordance with current directives. Loaned items will be carried in Account Code 73. Regulated items loaned will be reported by teletype to the Engineer Supply Control Office.

February 1951

27 January 1949

SUBJECT: Arrangements for Flood Fighting Assistance

6. The policy set forth herein is not to be confused with the policy of the Department of the Army on Disaster Relief outlined in AR 500-50 dated 17 August 1948 and AR 500-60 dated 1 December 1939.

7. The following directives are hereby rescinded:

a. OCE letter, dated 20 November 1946, file ENGBI, subject: "Arrangements for Flood Fighting Assistance."

b. Paragraph 2f of OCE letter, dated 22 July 1946, file ENGBI, subject: "Editing Policy at Depots."

BY ORDER OF THE CHIEF OF ENGINEERS:

/s/ J. A. Ostrand, Jr.
J. A. OSTRAND, JR.
Colonel, Corps of Engineers
Chief, Supply Division
Military Supply and Procurement

Following copied from Emergency Manual of North Atlantic Division.

AERIAL BOMBARDMENT OF ICE JAMS

A teletype message from the Office Chief of Engineers dated 9 March 1949 on the above subject reads as follows:

"This office is receiving an increasing number of requests from Members of Congress, individuals and organizations for aerial bombardment to assist in relieving ice jam floods. In general, Office, Chief of Engineers is opposed to the use of aerial bombardment of ice jams since there is no evidence to show that this method of treatment produces satisfactory results and has proved extremely hazardous. This office desires information from any Division Engineer who considers aerial bombardment of a particular ice jam to be indicated. No aerial bombardment of ice jams to be undertaken without the prior approval of this office. In the event aerial bombardment is attempted by persons not associated with the Corps of Engineers and without clearance from the Corps of Engineers full information on this incident should be submitted to this office by teletype."

February 1951

HARTFORD, CONNECTICUT

The Hartford flood protection consists of the following:

- 4,400 linear feet of concrete flood wall
- 34,000 linear feet of earth dike
- 5,600 linear feet of pressure conduit (Park River)
- 3,100 linear feet of pressure conduit (Gully Brook)
- 4 pumping stations (3 built by Corps of Engrs., 1 built by the city)
- 7 stop log structures
- 1 sand bag opening (Wethersfield)

The area protected is divided into four drainage systems for the purpose of handling sewage and storm water. These areas are inter-related, inasmuch as there is no intervening high ground; however, in the event of a failure, the North Section of the city can be isolated by the construction of a temporary dike, about 800 feet in length, along Morgan Street.

The four drainage areas of the city are as follows:

- a. The area north of Memorial Bridge behind the North Meadows dike and served by the North Meadows Pumping Station.
- b. The area of downtown Hartford around Bushnell Park, and served by the Bushnell Park Pumping Station and pressure conduits.
- c. The central section of the business district, east of Main Street, and served by the Keeney Lane Pumping Station.
- d. The southerly end of the city, including the area within the South Meadows Dike, and served by the South Meadows Pumping Station, which was built by the City of Hartford.

The dike system at Hartford is built for an elevation about five feet higher than the U. S. Engineer Department project grade, a betterment obtained by the contribution of funds by the City to the Government. The only exception to this is an area approximately 200 feet in length at the end of the South Meadows Dike and near the Wethersfield town line where the elevation of the dike is at the U. S. Engineer project grade and where sandbagging will be required at water elevations higher than 37.5 feet stage, Hartford Gage, or 37.0 feet, M.S.L.

The method and sequence of operations in prosecuting a flood fight are set forth in the Operations and Maintenance Manual for Flood Protection System, Hartford, Connecticut, issued by this office and sent to the City.

February 1953

FLOOD FREQUENCIES DURING MARCH - JUNE
based on records from 1838-1938, incl.

<u>Frequency</u>	<u>Stage*</u>	<u>Elev. M.S.L.</u>
Annual	30.0	17.45
2 years	29.0	20.45
5 years	23.0	22.45
10 years	25.0	24.45
20 years	27.0	26.45
50 years	29.5	28.95

*On the USWB Gage - Memorial Bridge the
zero of which is elevation minus 0.55'
M.S.L.

PREVIOUS HIGH WATER ELEVATIONS

	<u>Elev. M.S.L.</u>
Nov. 1927 Flood - Approximately	28.4
Mar. 1936 Flood - Approximately	37.0
Sept. 1938 Flood - Approximately	34.8
Dec. 1948 Flood - Approximately	25.0

ESTIMATED SANDBAG REQUIREMENTS

Stop-log closures	2,000
Sand Boils and sloughs	10,000
Wethersfield end of dike	13,000
TOTAL	25,000

Recommended stock level for storage - 10,000 to 15,000
On hand 10 January 1953 - 30,000

February 1953

CITY OF HARTFORD

Hartford
Exchange

City Manager: Carleton F. Sharpe
550 Main Street 2-8181
(Res.) 88 Kenyon Street 33-1143

Superintendent of Maintenance and Operation
of Flood Protection System: Charles W. Cooke
Director Of Public Works
550 Main Street 2-8181
(After business hours) 2-7606
(Res.) 9 Madison Street 2-5429

Note: Mr. Cooke has a radio telephone in his car.
Call Hartford Operator, ask for Mobile Operator,
then ask JL-4-7723.

Deputy Superintendent of Maintenance and Operation
of Flood Protection System: L. C. Lovell
550 Main Street 2-8181
(Res.) 299 Princeton Street 4-0289

Pumping Station Operators: B. F. Buckland
(Res.) 124 Jefferson Street 2-6596

Donald DiCioccio
(Res.) 1794 Broad Street 5-2489

Pumping Stations:
North Meadows 2-2308
South Meadows 4-5579
Potter Street 7-9592
Keeney Lane 2-7019
Bushnell Park 4-5017

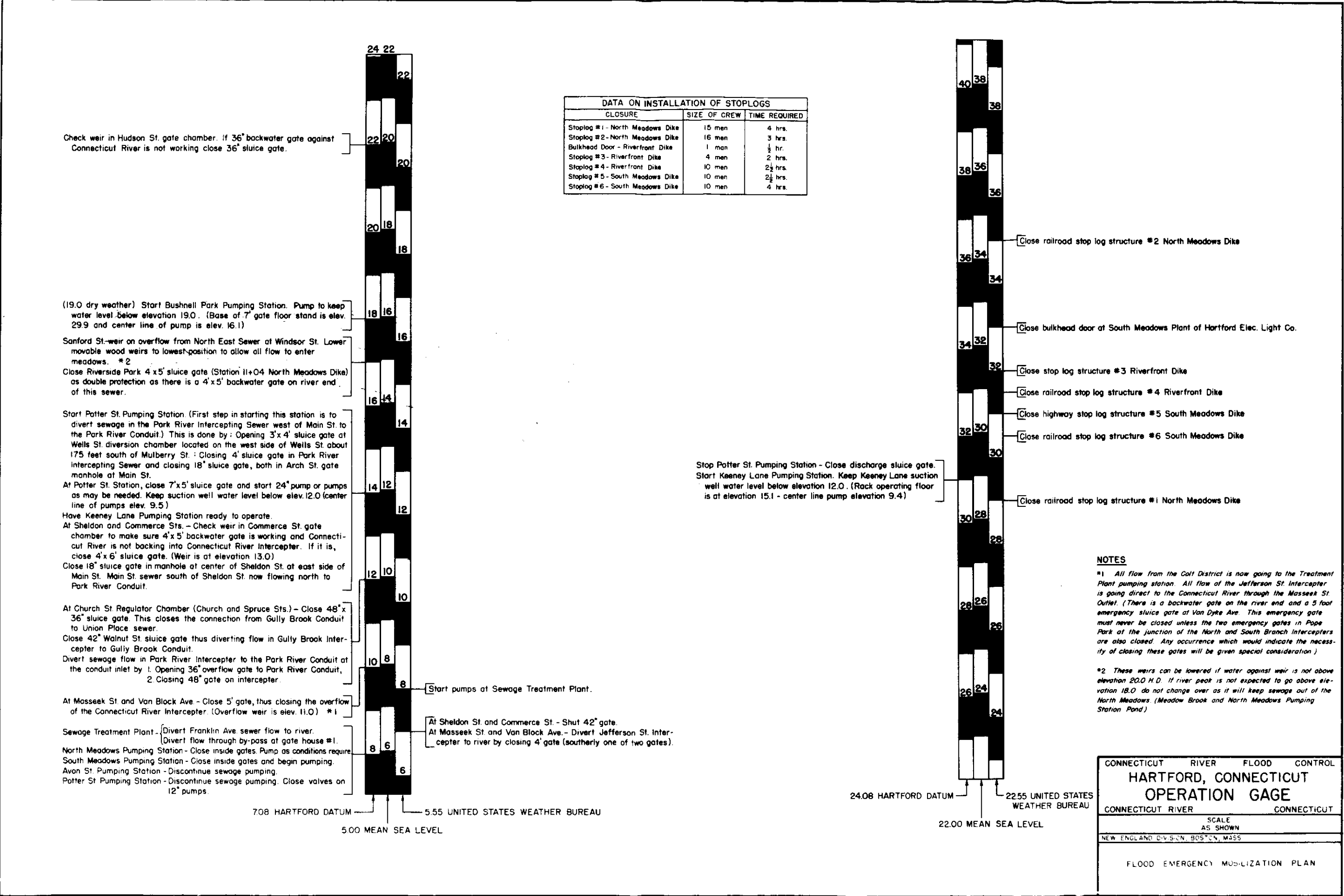
State Police Headquarters: 100 Washington Street 5-0181

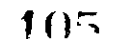
City Police Headquarters: 85 Market Street 7-0112

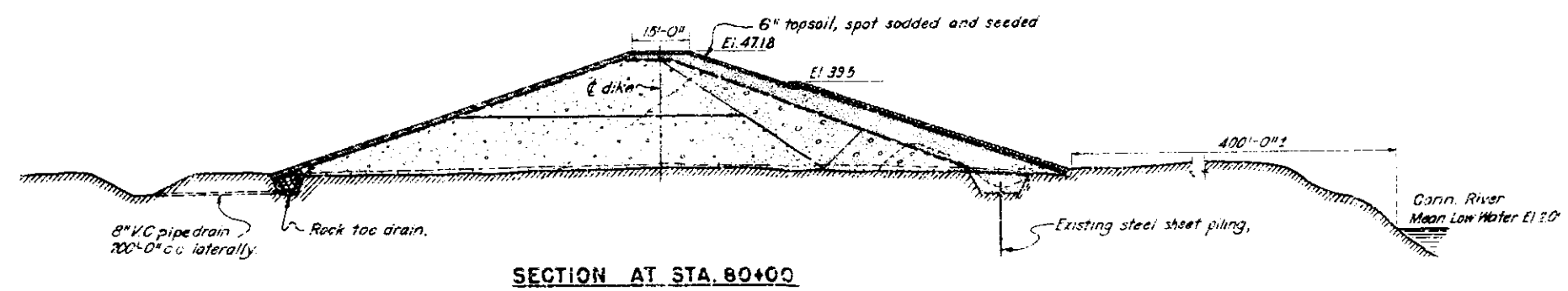
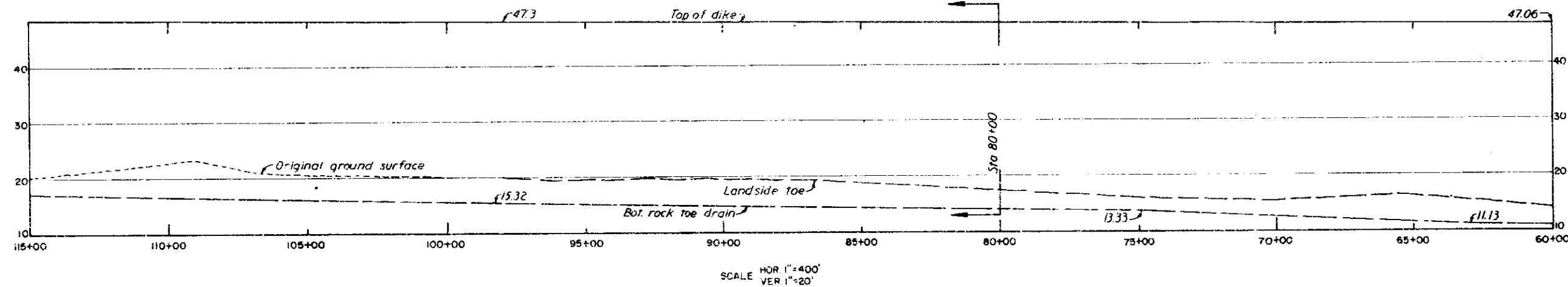
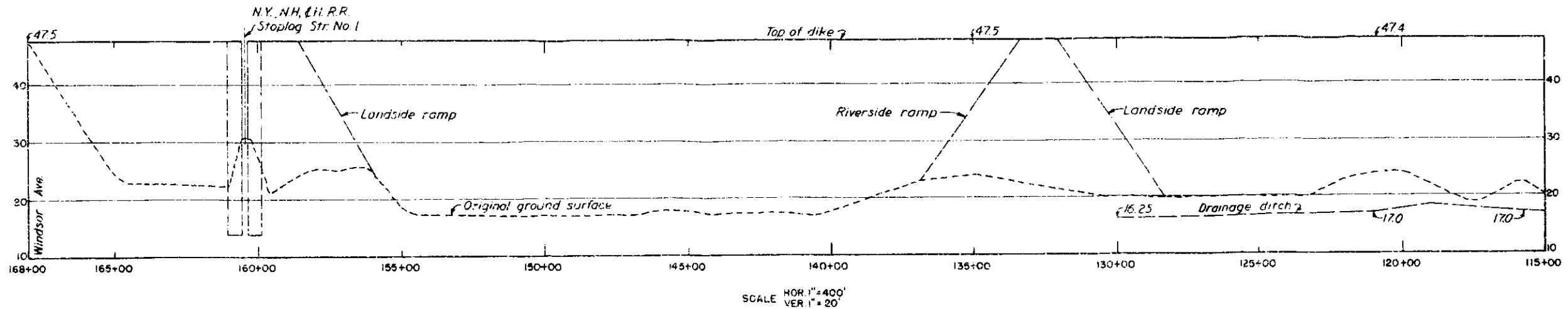
Red Cross Headquarters: 125 Trumbull Street 7-1891

Disaster Radio Center 6-3181

February 1953







CONNECTICUT RIVER FLOOD CONTROL

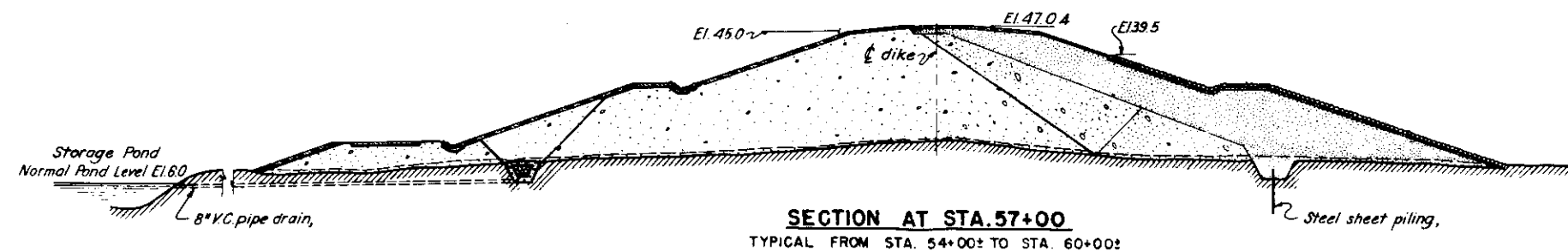
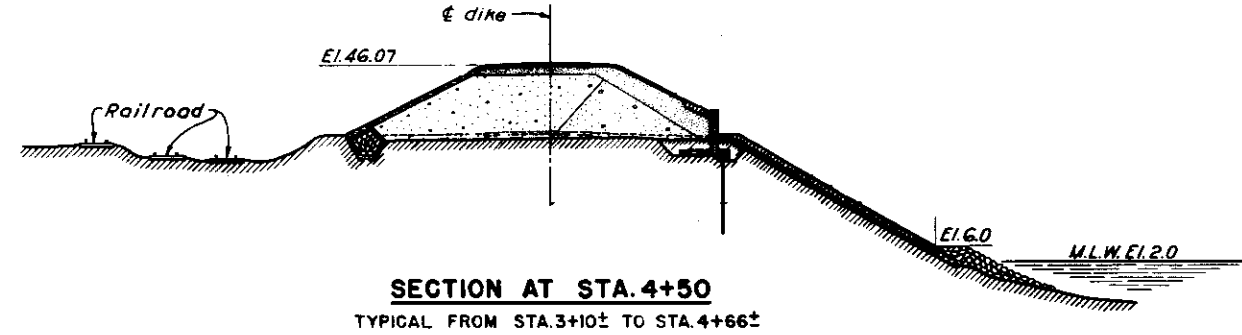
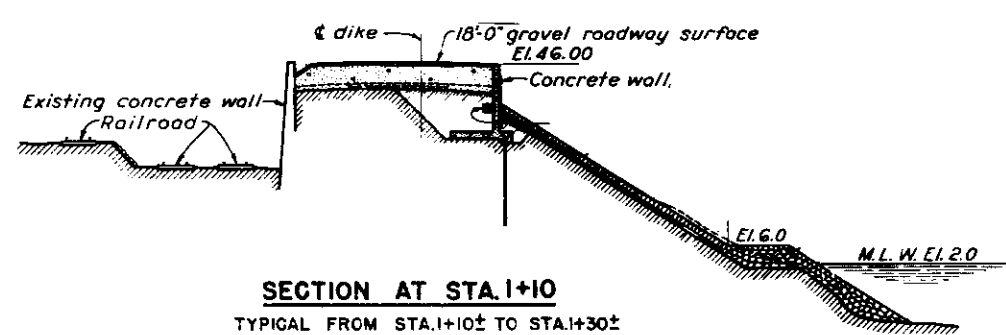
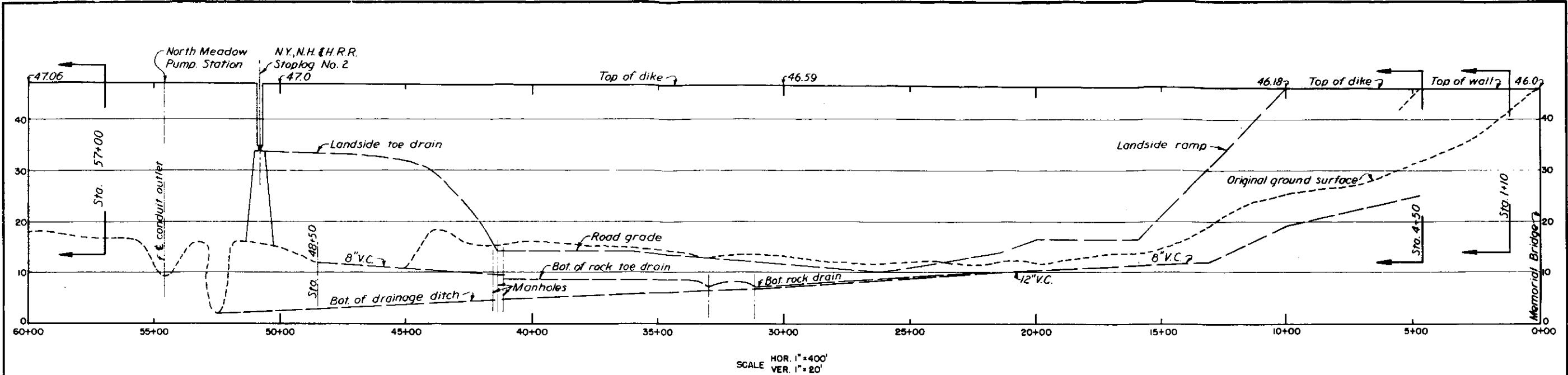
HARTFORD DIKE

PROFILES & TYPICAL SECTIONS

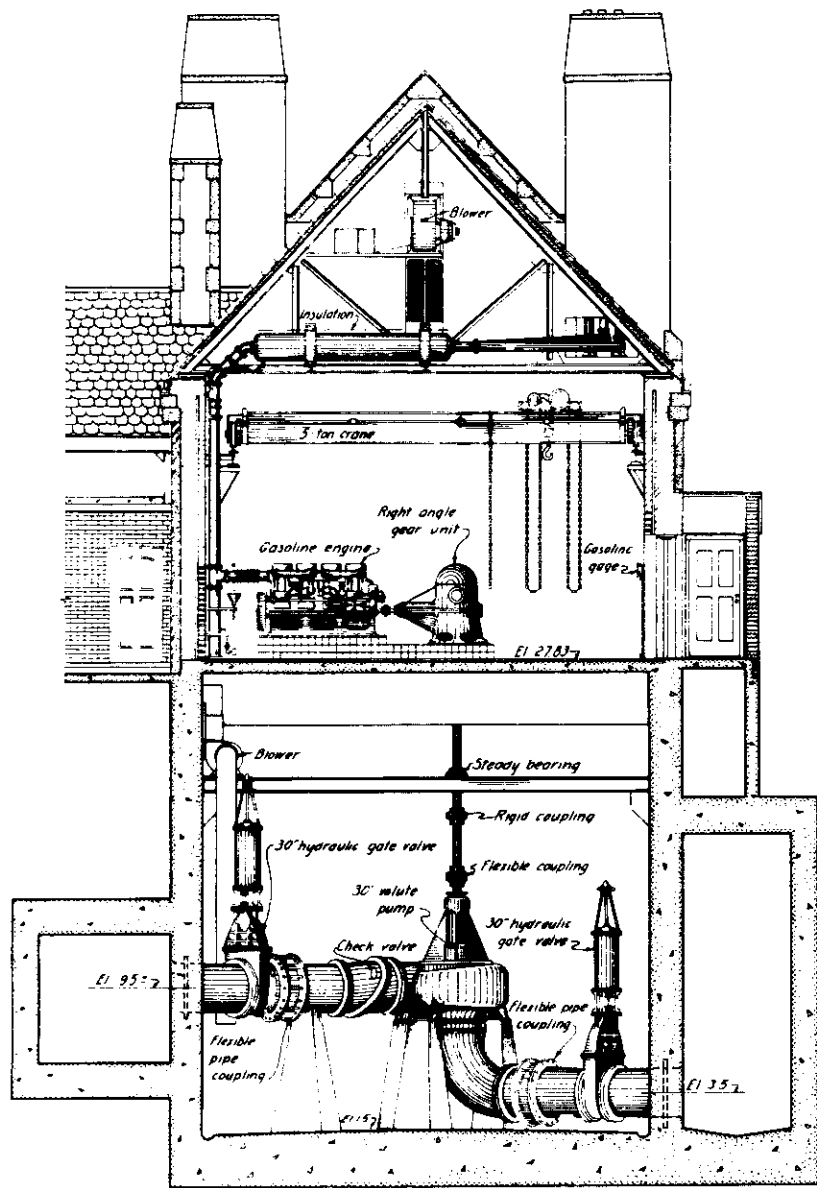
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FLOOD EMERGENCY MOBILIZATION PLAN

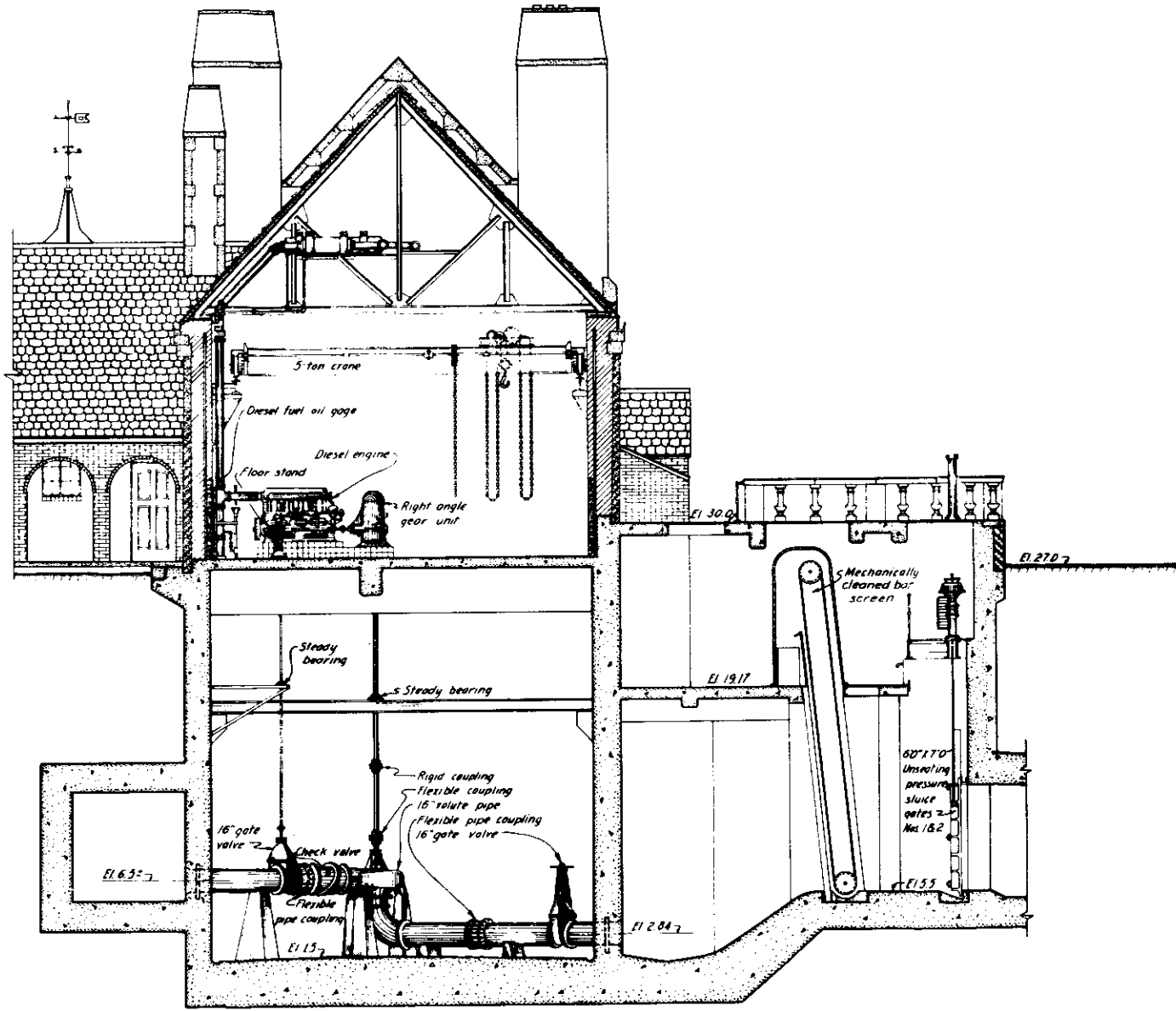
PREPARED BY
CORPS OF ENGINEERS, U.S. ARMY
OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION, BOSTON, MASS.



CONNECTICUT RIVER FLOOD CONTROL
HARTFORD DIKE
PROFILES & TYPICAL SECTIONS
CONNECTICUT RIVER CONNECTICUT
FLOOD EMERGENCY MOBILIZATION PLAN
PREPARED BY
CORPS OF ENGINEERS, U.S. ARMY
OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION, BOSTON, MASS.

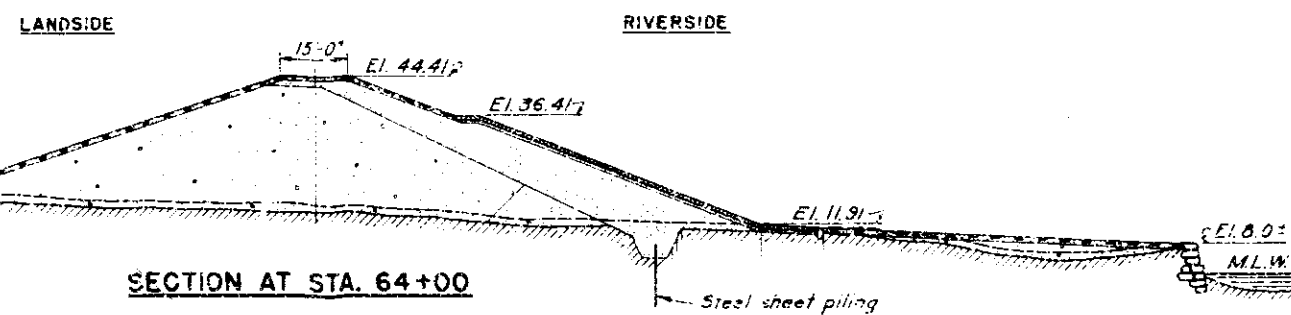


SECTION - A

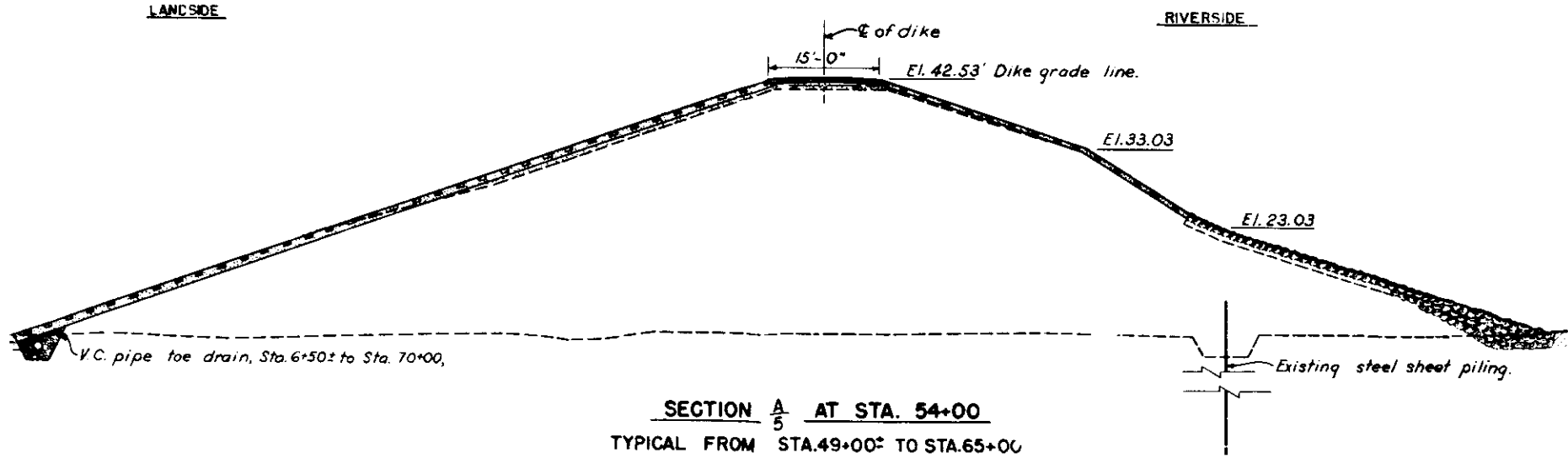
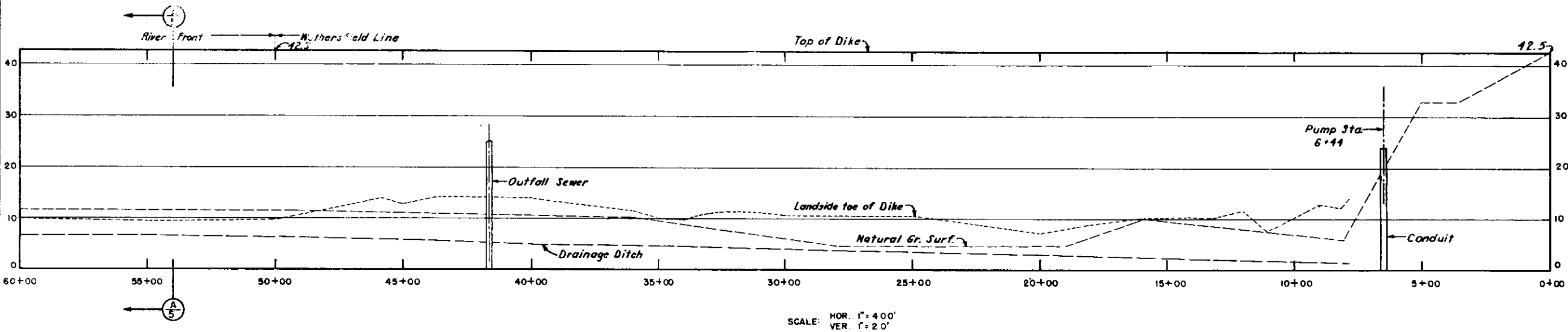
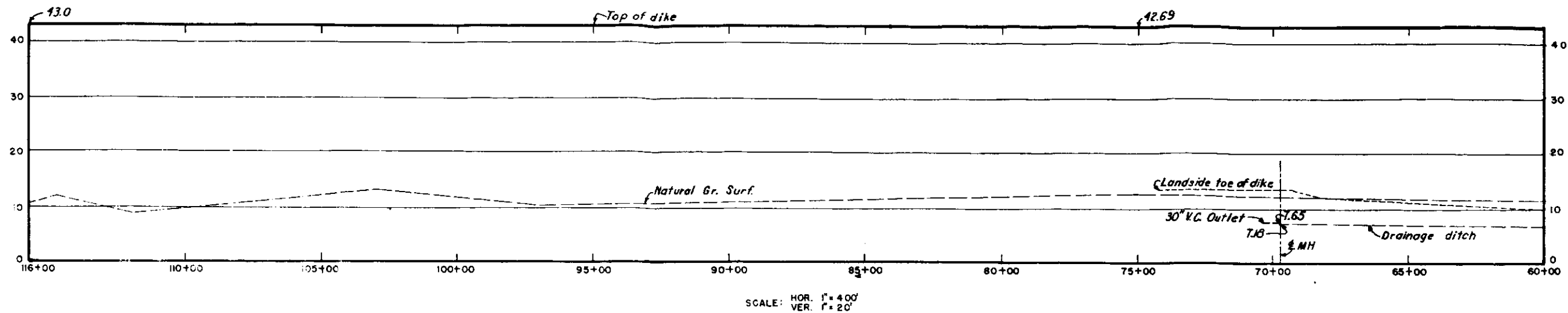


SECTION - B

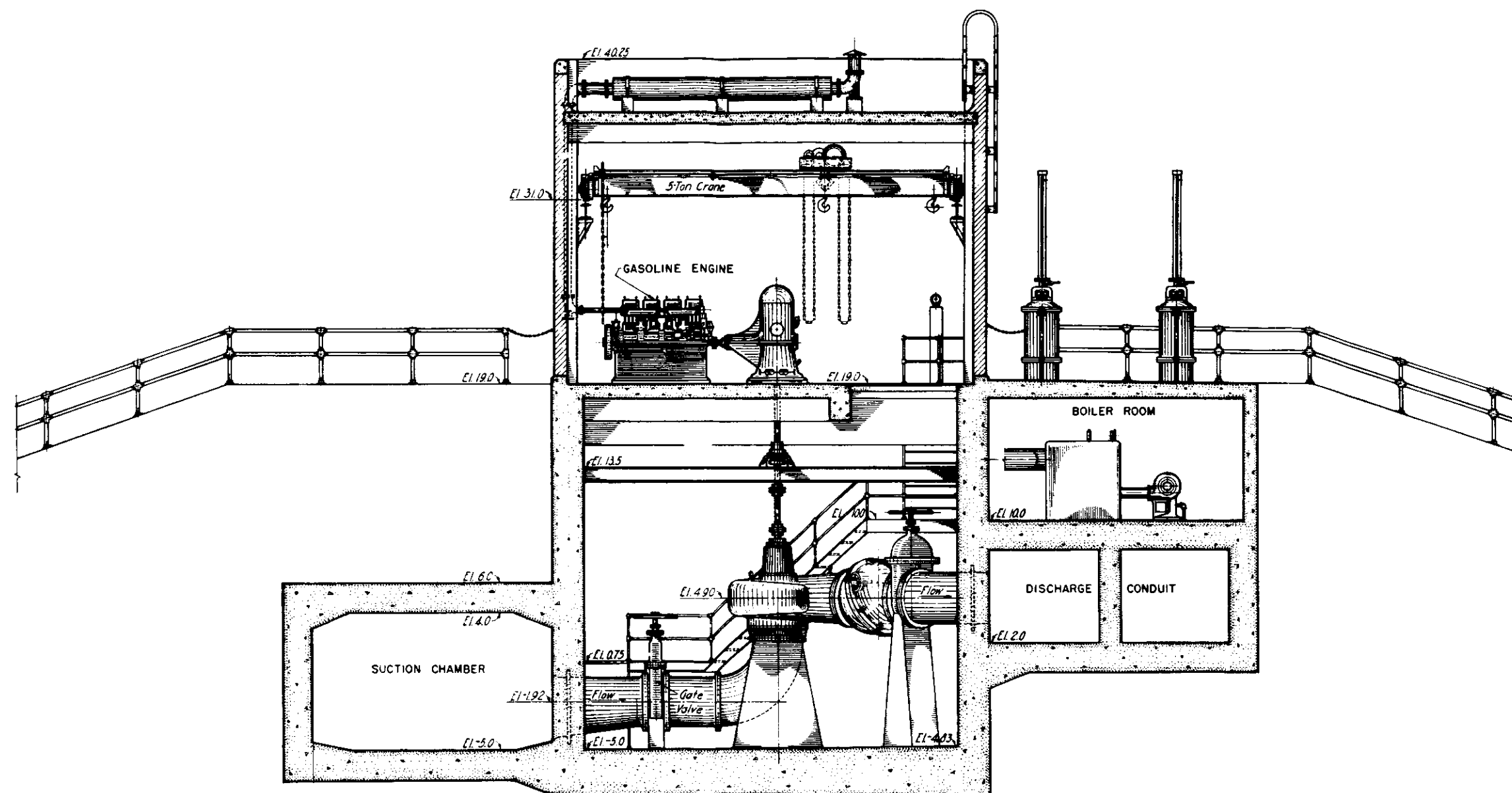
CONNECTICUT RIVER FLOOD CONTROL	
BUSHNELL PARK PUMPING STATION	
HARTFORD, CONN.	
EQUIPMENT	
GENERAL ARRANGEMENT, NO. 3	
PARK RIVER	CONNECTICUT
SCALE: 1/4" = 1' 0"	
NEW ENGLAND DIVISION, BOSTON, MASS.	
FLOOD EMERGENCY MOBILIZATION PLAN	



108



CONNECTICUT RIVER FLOOD CONTROL
HARTFORD DIKE
PROFILES & TYPICAL SECTIONS
CONNECTICUT RIVER, CONNECTICUT
FLOOD EMERGENCY MOBILIZATION PLAN
PREPARED BY
CORPS OF ENGINEERS, U.S. ARMY
OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION, BOSTON, MASS.



GENERAL ARRANGEMENT OF EQUIPMENT

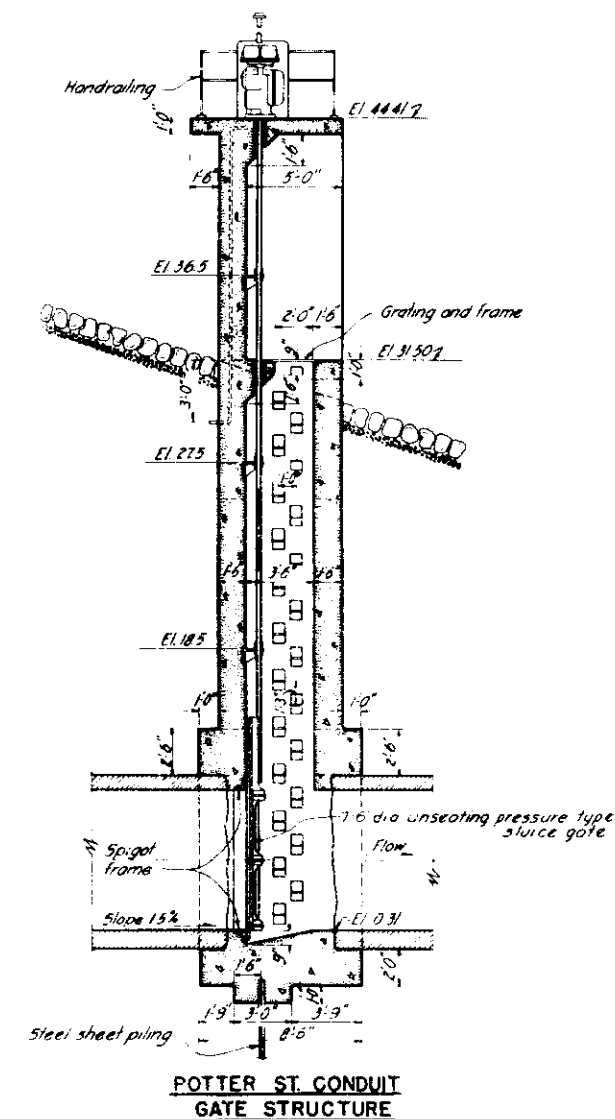
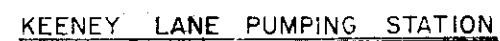
CONNECTICUT RIVER FLOOD CONTROL
NORTH MEADOWS PUMPING STATION

HARTFORD, CONN.

CONNECTICUT RIVER CONNECTICUT

FLOOD EMERGENCY MOBILIZATION PLAN

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OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION, BOSTON, MASS.



CONNECTICUT RIVER FLOOD CONTROL
KEENEY LANE PUMPING STATION
HARTFORD, CONN
CONNECTICUT RIVER CONNECTICUT
NEW ENGLAND DIVISION, BOSTON, MASS
FLOOD EMERGENCY MOBILIZATION PLAN

EAST HARTFORD, CONNECTICUT

The flood protection system for East Hartford, Connecticut, consists of the following:

- 750 linear feet of concrete flood wall
- 20,000 linear feet of earth dike
- 3 pumping stations
- 2 stop log structures
- 1 bulkhead door

The dike system extends along the Connecticut and Hockanum Rivers from the high ground near Greene Terrace in the north to high ground at Brewer Lane and Central Avenue in the south. The pumping plants are as follows:

- Cherry Street Pumping Station
- Pitkin Street Pumping Station
- Meadow Hill Pumping Station

The largest and most important of these is the Meadow Hill Pumping Station in conjunction with which a storage pond has been provided. The design of this station is based upon the storage pond being pumped down to its low point at the start of peak run-off.

Dike profiles and typical sections, also pumping station and stop-log structures details are shown on plans on the following pages.

The method and sequence of operations in prosecuting a flood fight are set forth in detail in the Operation and Maintenance Manual for Flood Protection System, East Hartford, Connecticut, issued by this office and sent to the Town. The procedure, in general, consists of starting of the pumping stations and closing of stop-log structures at appropriate river stages as shown on General Plan of East Hartford Flood Control Works. The datum for the United States Weather Bureau Gage at Memorial Bridge is 0.55 feet below M.S.L. datum.

February 1951

FLOOD FREQUENCIES DURING MARCH - JUNE
based on records from 1838-1938, incl.

<u>Frequency</u>	<u>Stage*</u>	<u>Elev. M.S.L.</u>
Annual	18.0	17.45
2 years	21.0	20.45
5 years	23.0	22.45
10 years	25.0	24.45
20 years	27.0	26.45
50 years	29.5	28.95

*On the USWB Gage - Memorial Bridge, the
zero of which is elevation minus 0.55' M.S.L.

PREVIOUS HIGH WATER ELEVATIONS

	<u>Elev. M.S.L.</u>
Nov. 1927 Flood - Approximately	29.0
Mar. 1936 Flood - Approximately	37.6
Sept. 1938 Flood - Approximately	35.4
Dec. 1948 Flood - Approximately	25.0

ESTIMATED SANDBAG REQUIREMENTS

Stop-log closures	2,000
Sand boils and sloughs	5,000
Raising dike one (1) foot	<u>60,000</u>
TOTAL	67,000

Recommended stock level for storage - 6,000 to 8,000
On hand 10 January 1952 - 1,700
Available 10 January 1952 - 5,000

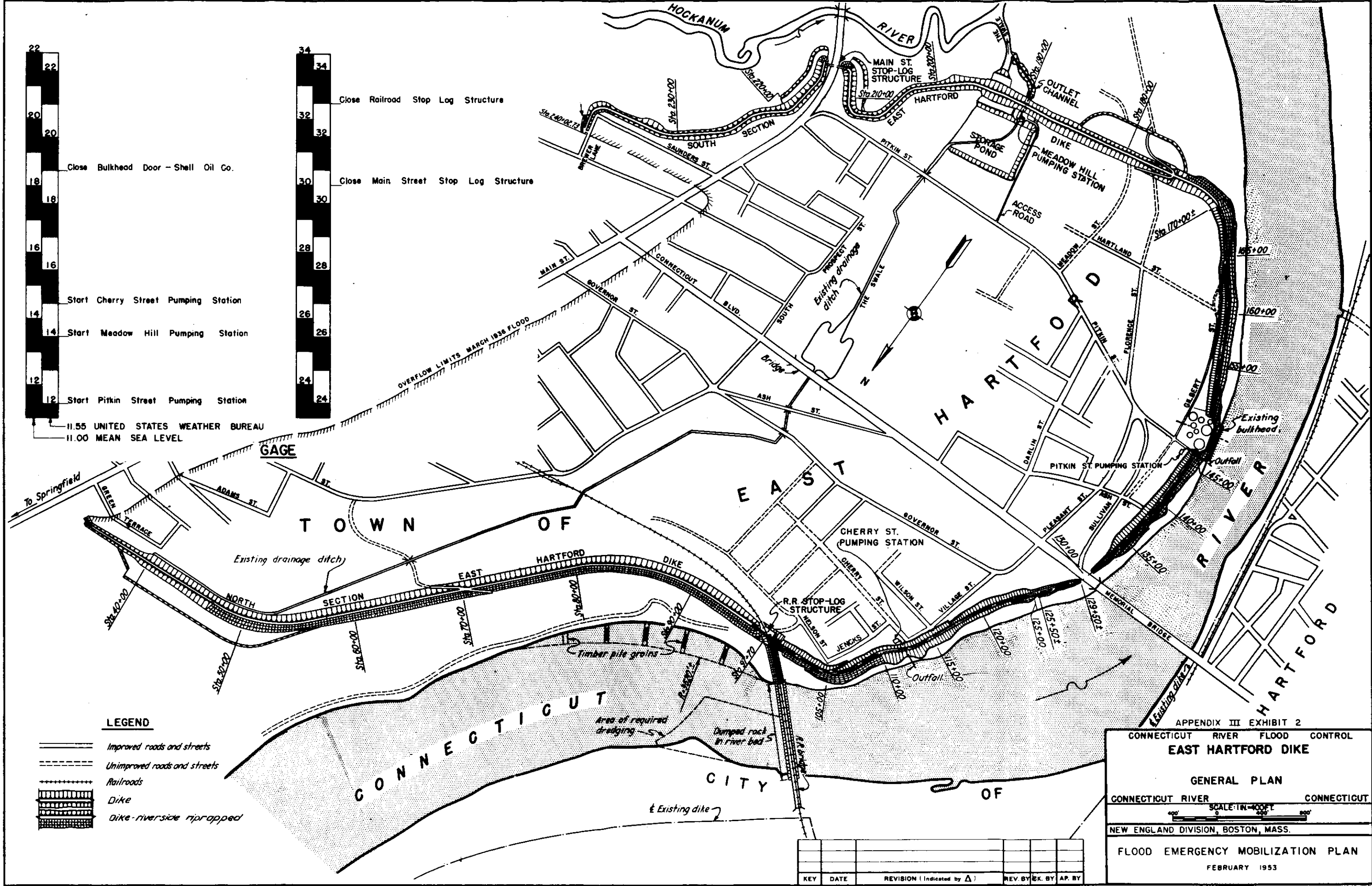
February 1952

TOWN OF EAST HARTFORD

Jackson
Exchange

<u>President of Town Council:</u>	John W. Torpey Town Hall 740 Main Street (Res.) 262 Park Ave.	8-4892 8-6820
<u>Superintendent of Maintenance and Operation of Flood Protection System:</u>	Edward Moore Meadow Hill Pumping Station (Res.) 13 Burnside Ave. (After 8:00 P.M.)	8-2356 8-0248 8-3714
<u>Director of Public Works:</u>	G. J. Penney Town Hall 740 Main Street (Res.) 269 Burnside Ave.	8-4892 8-2579
<u>Chairman of East Hartford Flood Commission:</u>	Seward Strickland (Res.) 1898 Main Street Business Phone	8-1622 5-1144

February 1954



APPENDIX III EXHIBIT 2
CONNECTICUT RIVER FLOOD CONTROL
EAST HARTFORD DIKE

GENERAL PLAN

CONNECTICUT RIVER CONNECTICUT

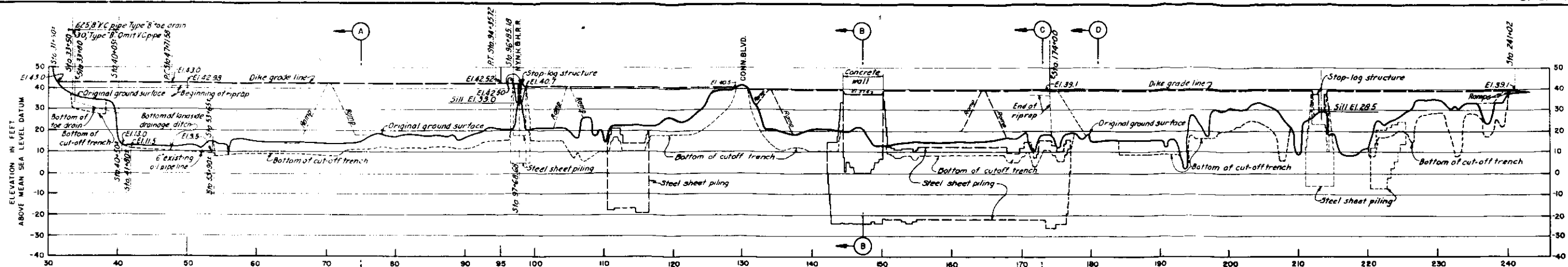
SCALE: 1"=400' ±

NEW ENGLAND DIVISION, BOSTON, MASS.

FLOOD EMERGENCY MOBILIZATION PLAN

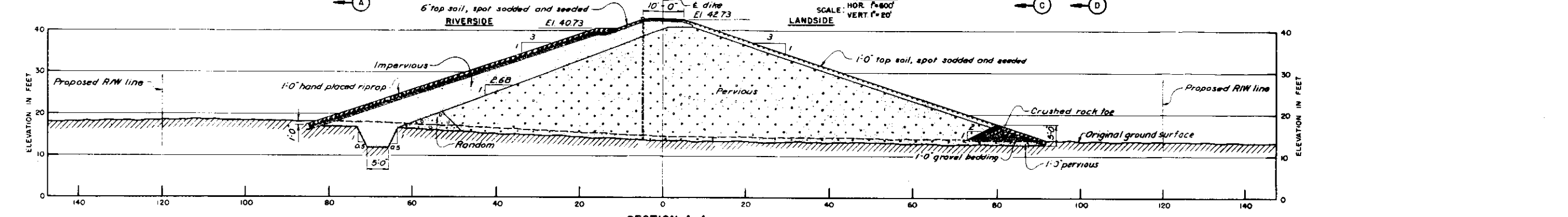
FEBRUARY 1953

KEY	DATE	REVISION (Indicated by Δ)	REV. BY	EX. BY	AP. BY

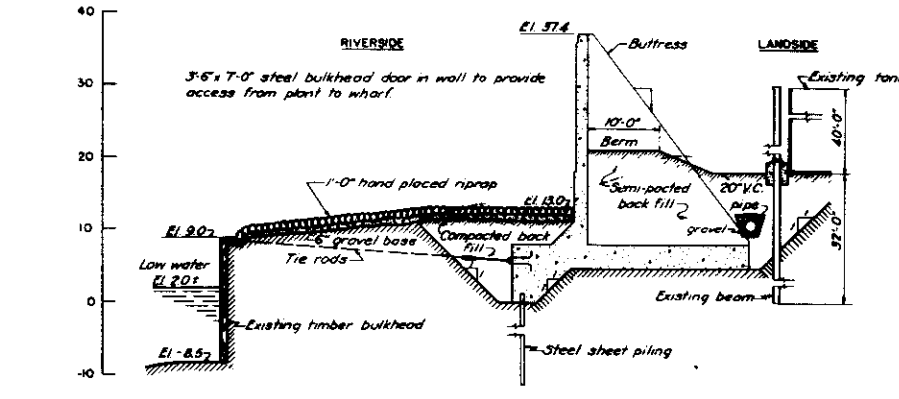


DIKE PROFILE

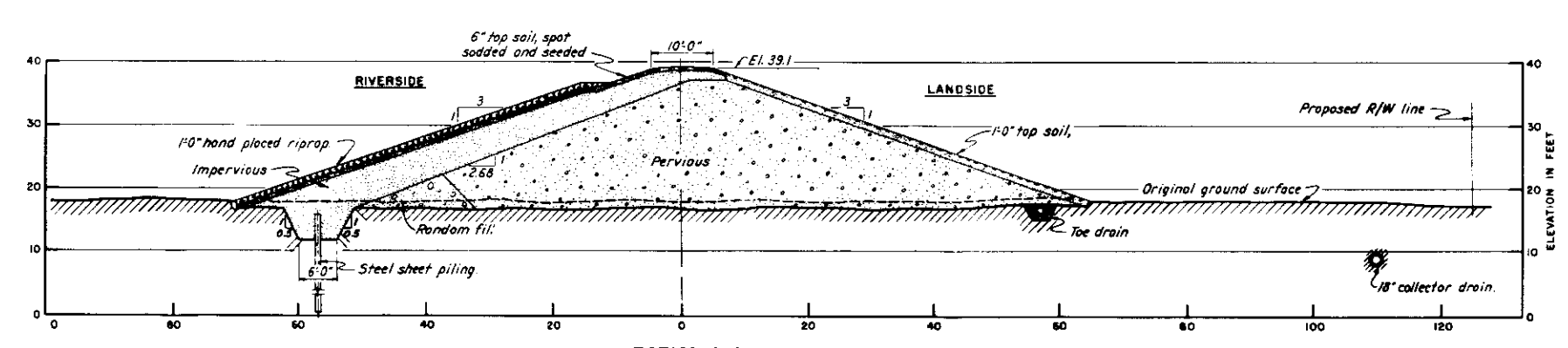
SCALE: HOR. 1"=80' VERT. 1"=20'



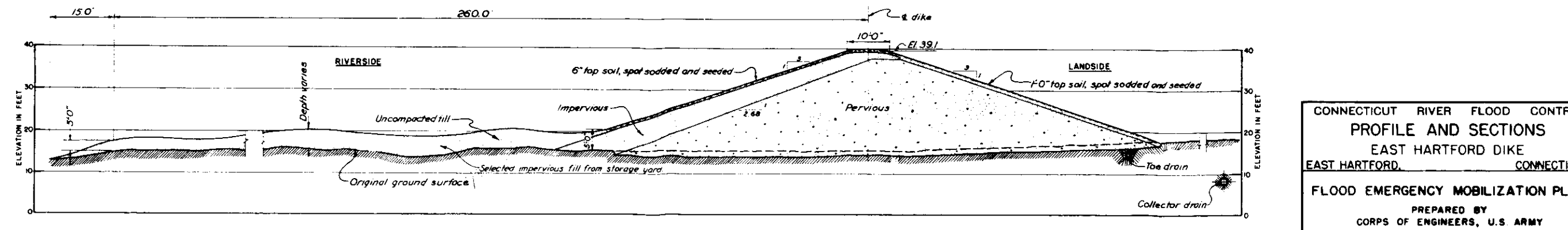
SECTION A-A



SECTION B-B

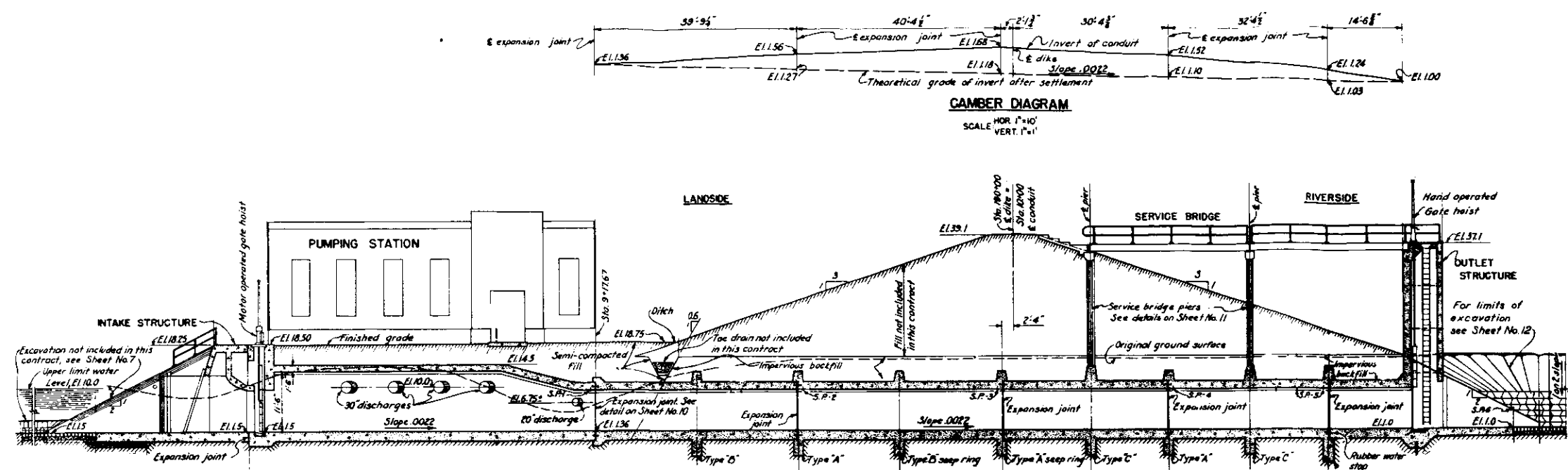


SECTION C-C



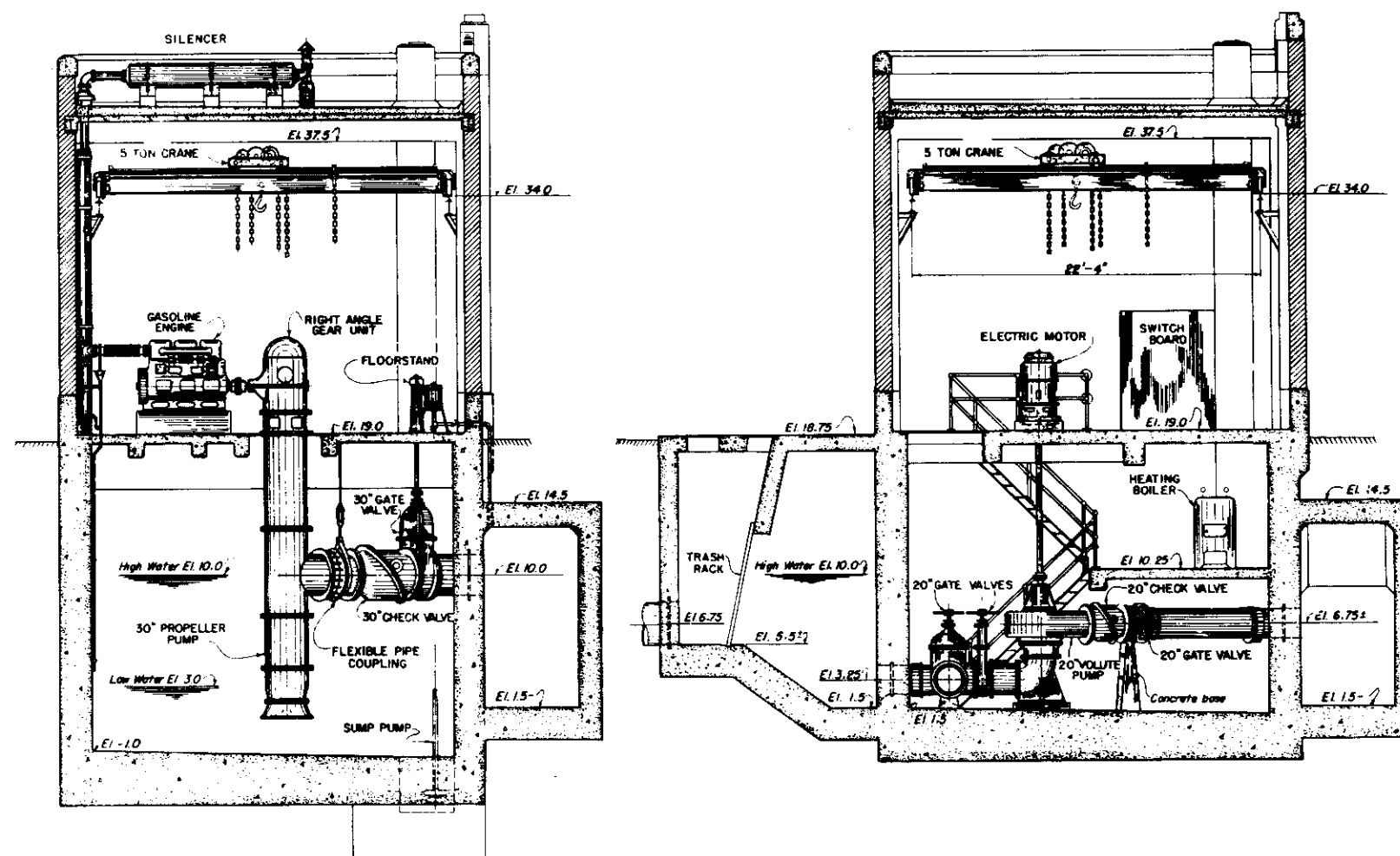
SECTION D-D

CONNECTICUT RIVER FLOOD CONTROL
PROFILE AND SECTIONS
EAST HARTFORD DIKE
EAST HARTFORD, CONNECTICUT
FLOOD EMERGENCY MOBILIZATION PLAN
PREPARED BY
CORPS OF ENGINEERS, U.S. ARMY
OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION, BOSTON, MASS.



CAMBER DIAGRAM

SCALE: HOR. 1"=10' VERT. 1"=1'

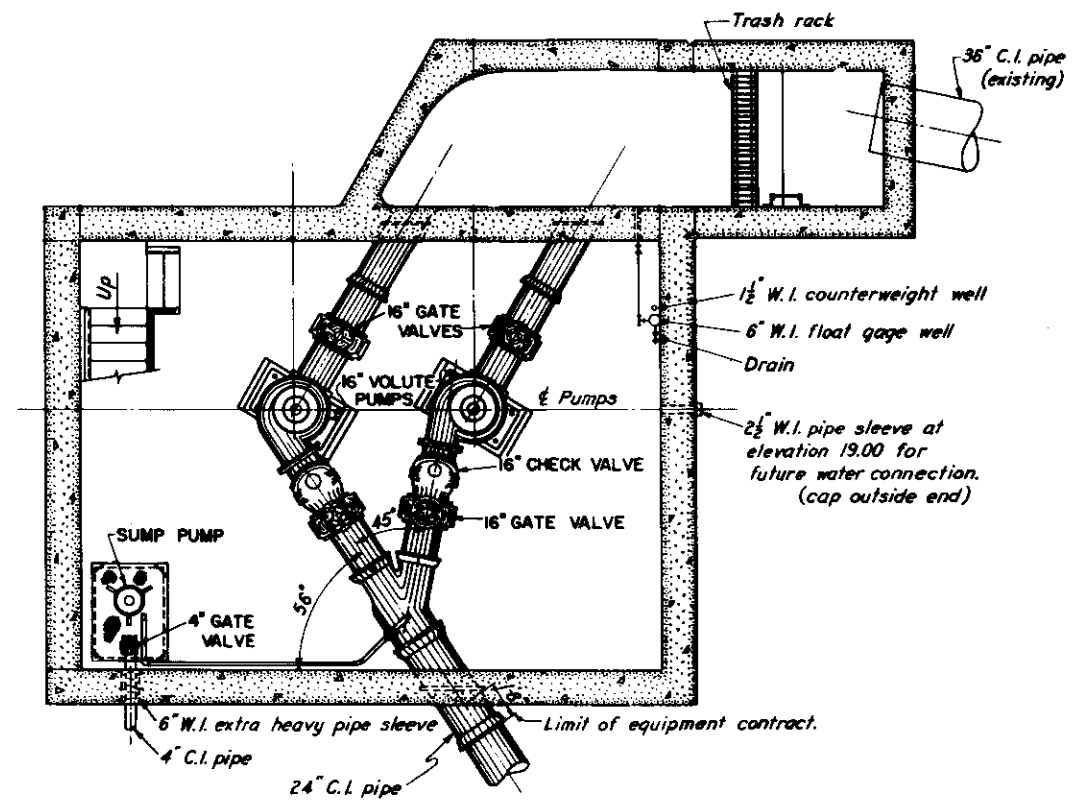
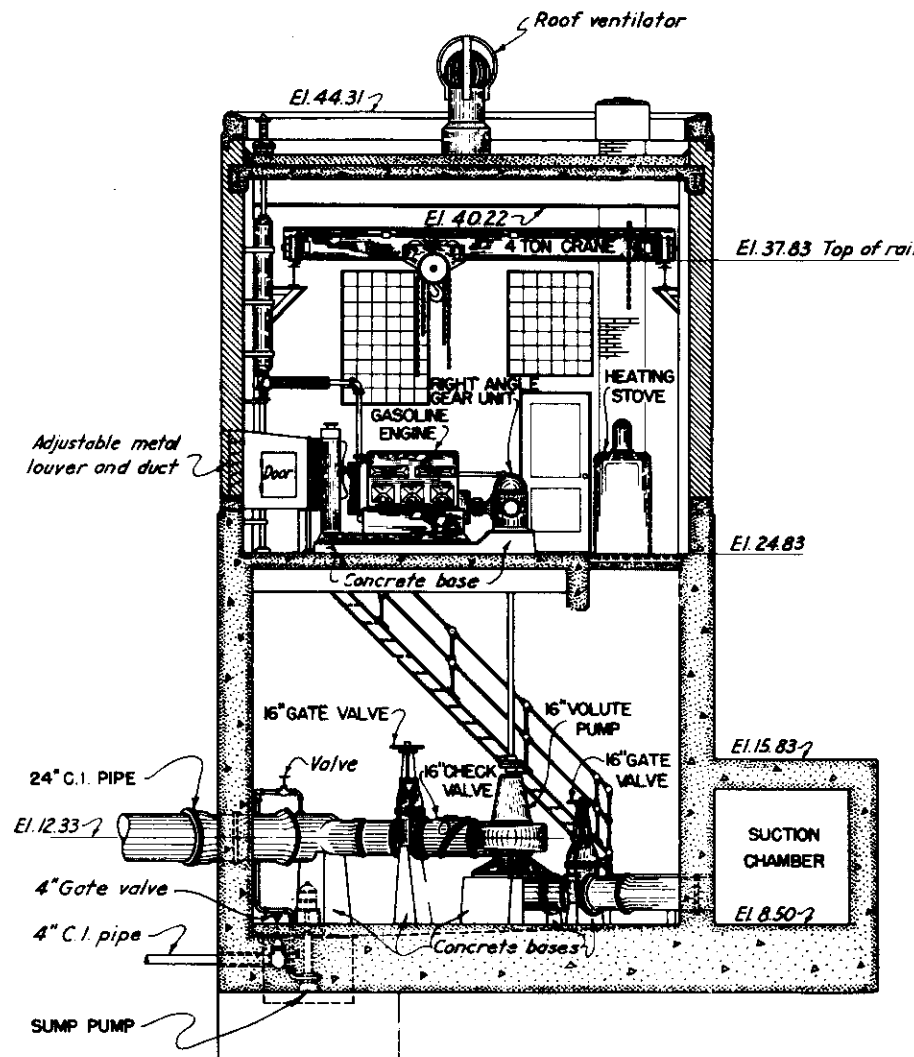


CONNECTICUT RIVER FLOOD CONTROL
MEADOW HILL PUMPING STATION
EAST HARTFORD, CONN.

CONNECTICUT RIVER CONNECTICUT

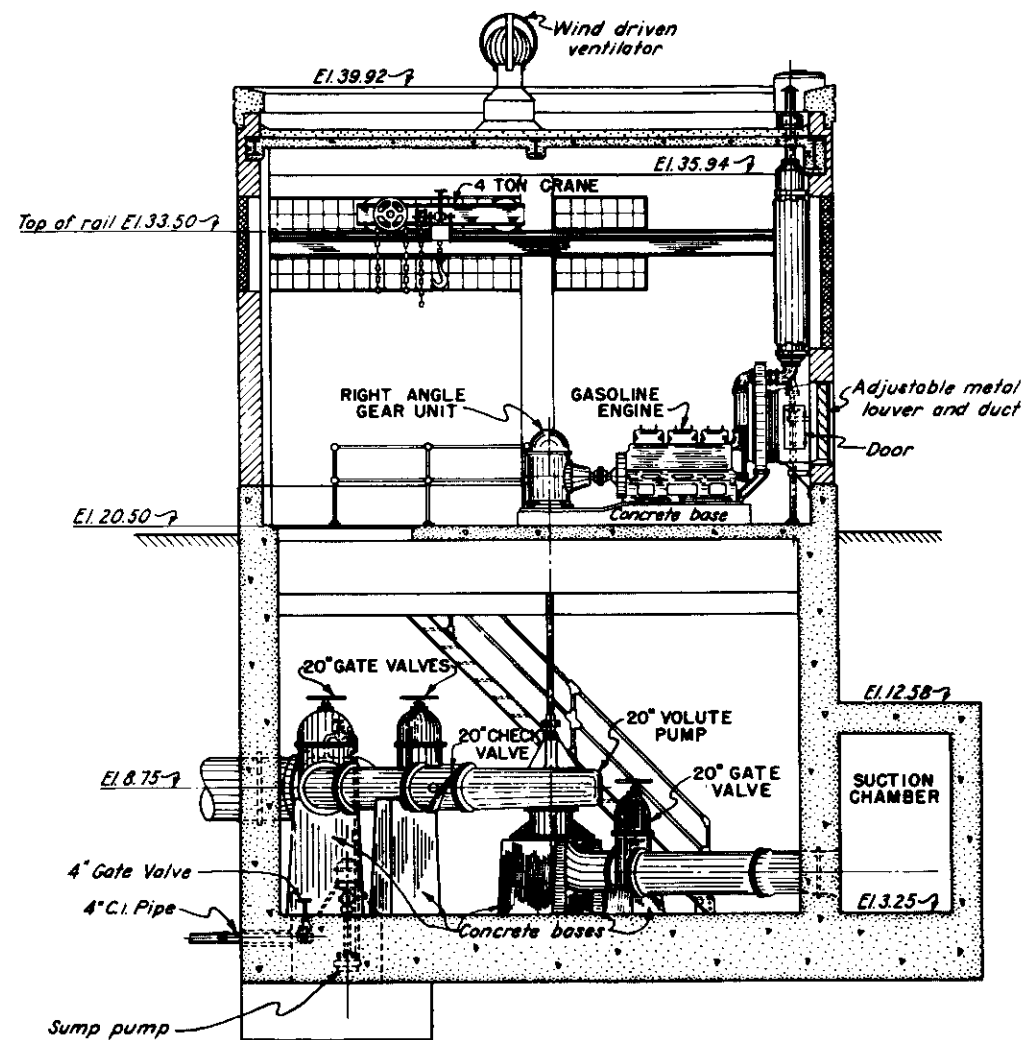
FLOOD EMERGENCY MOBILIZATION PLAN

PREPARED BY
CORPS OF ENGINEERS, U.S. ARMY
OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION, BOSTON, MASS.

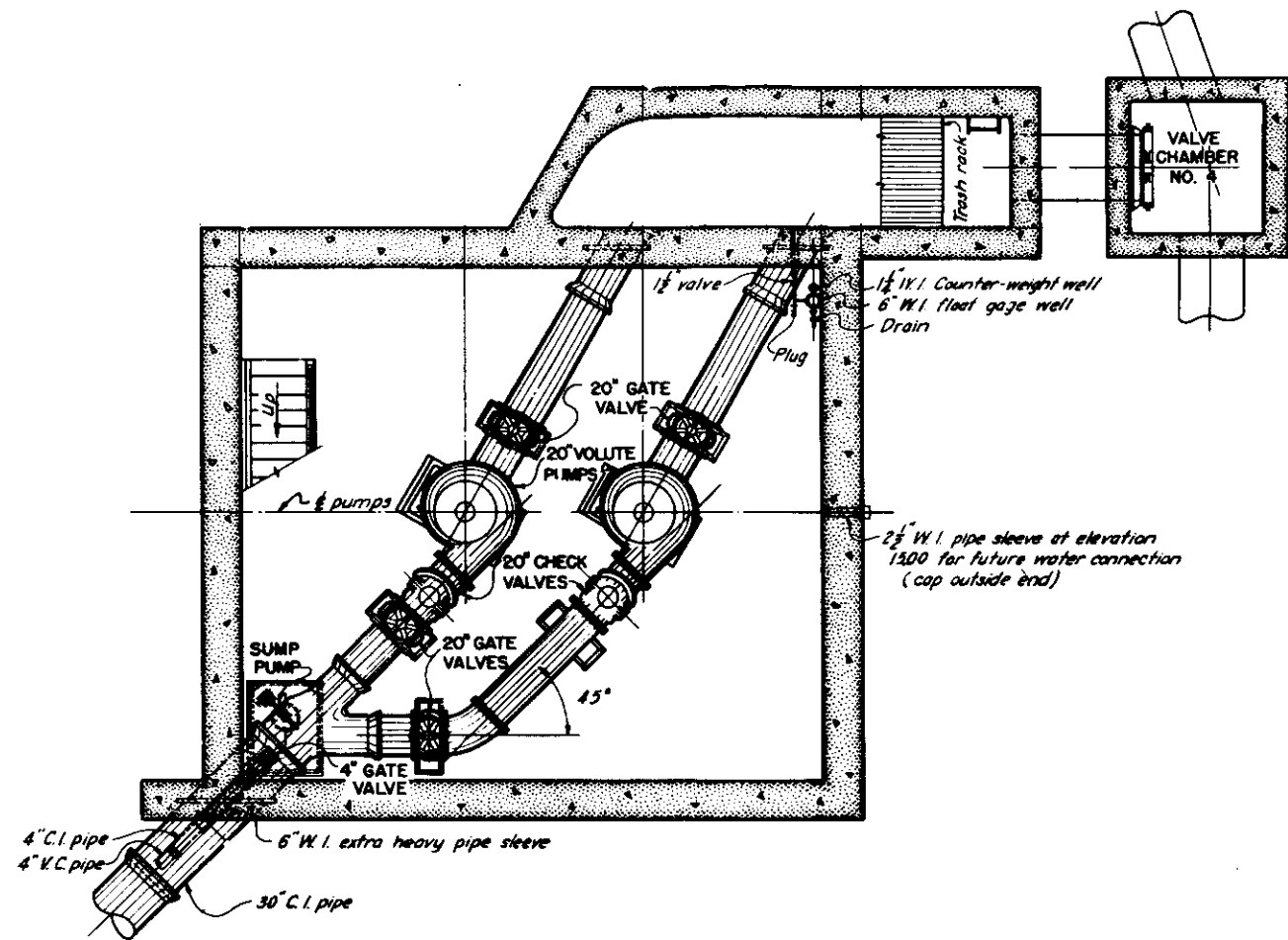


PUMP ROOM PLAN

CONNECTICUT RIVER FLOOD CONTROL
CHERRY STREET PUMPING STATION
EAST HARTFORD, CONN.
CONNECTICUT RIVER CONNECTICUT
FLOOD EMERGENCY MOBILIZATION PLAN
PREPARED BY
CORPS OF ENGINEERS, U.S. ARMY
OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION, BOSTON, MASS.



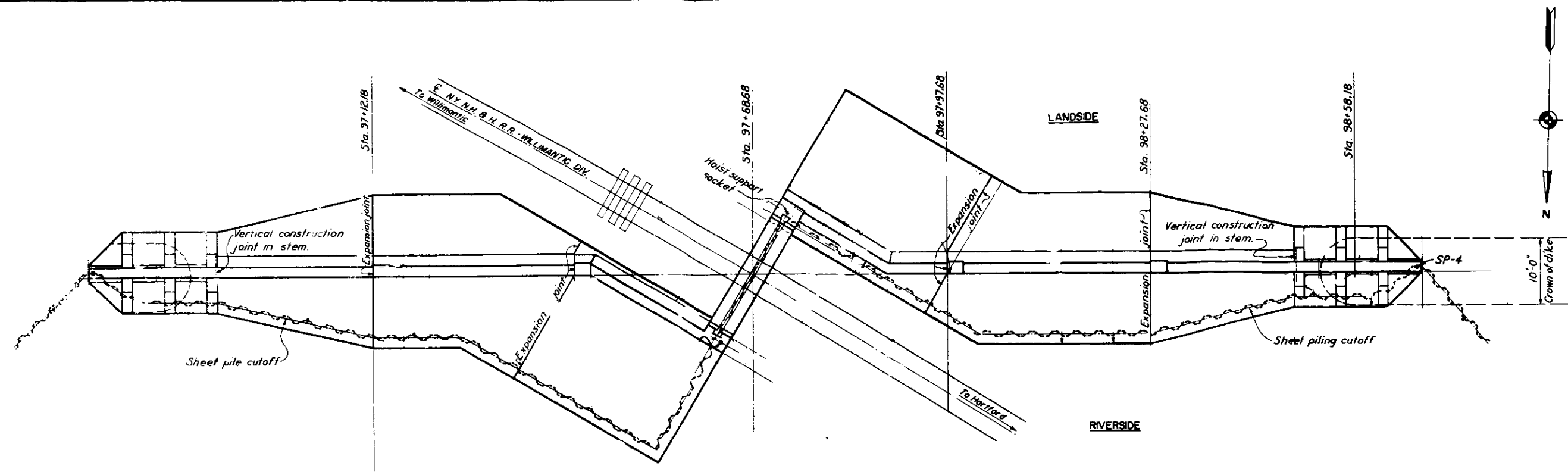
SECTION



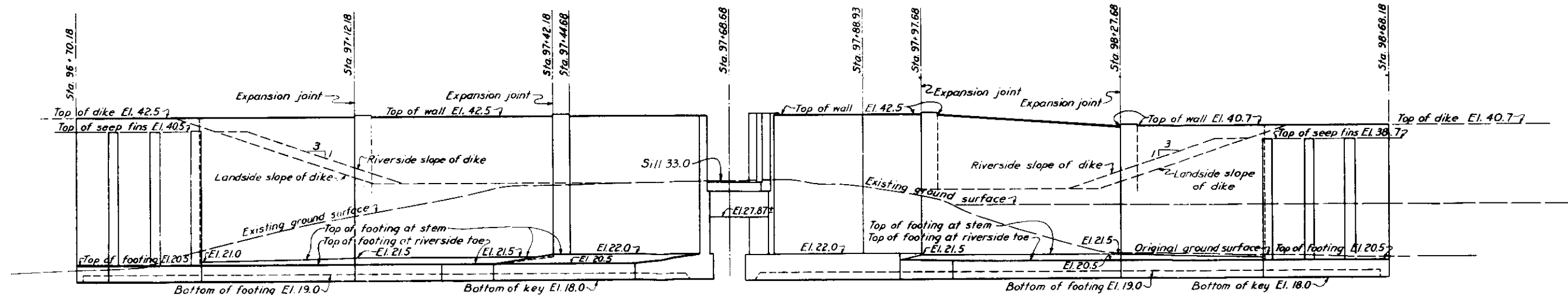
PUMP ROOM PLAN

SCALE: 1/4 IN. = 1 FT.

CONNECTICUT RIVER FLOOD CONTROL
PITKIN STREET PUMPING STATION
EAST HARTFORD, CONN.
CONNECTICUT RIVER CONNECTICUT
FLOOD EMERGENCY MOBILIZATION PLAN
PREPARED BY
CORPS OF ENGINEERS, U.S. ARMY
OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION, BOSTON, MASS.

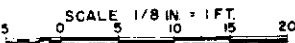


PLAN

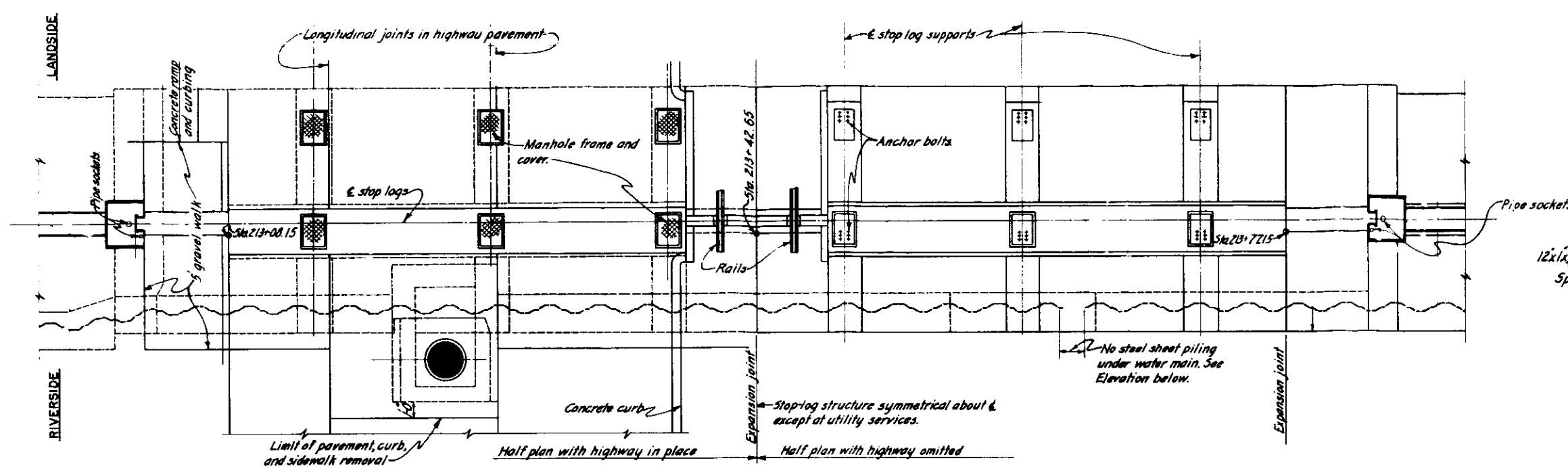


RIVERSIDE ELEVATION

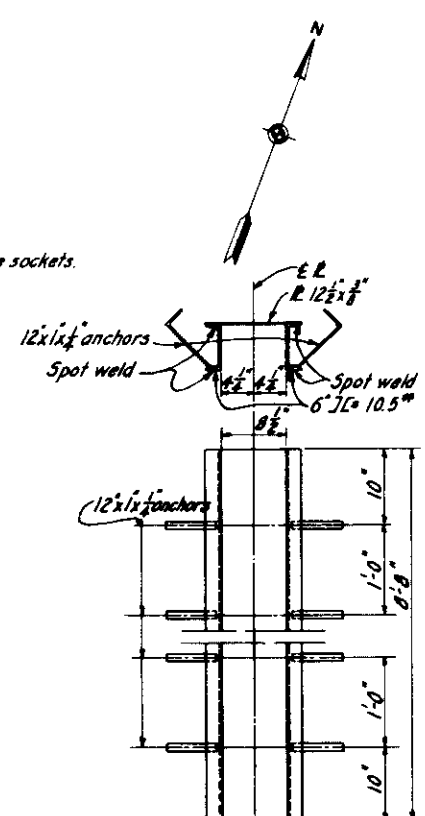
NOTES
Elevations refer to Mean Sea Level Datum.
All stations are on E. of dike, and riverside face of wall is on E. of dike except between Sta. 97+44.68 and Sta. 97+88.93.



CONNECTICUT RIVER FLOOD CONTROL	
EAST HARTFORD DIKE	
FLOOD EMERGENCY MOBILIZATION PLAN	
RAILROAD STOP-LOG STRUCTURE	
CONNECTICUT RIVER	CONNECTICUT
FLOOD EMERGENCY MOBILIZATION PLAN	
PREPARED BY	
CORPS OF ENGINEERS, U.S. ARMY	
OFFICE OF THE DIVISION ENGINEER	
NEW ENGLAND DIVISION, BOSTON, MASS.	



PLAN



DETAILS OF STOP-LOG GROOVE CHANNELS

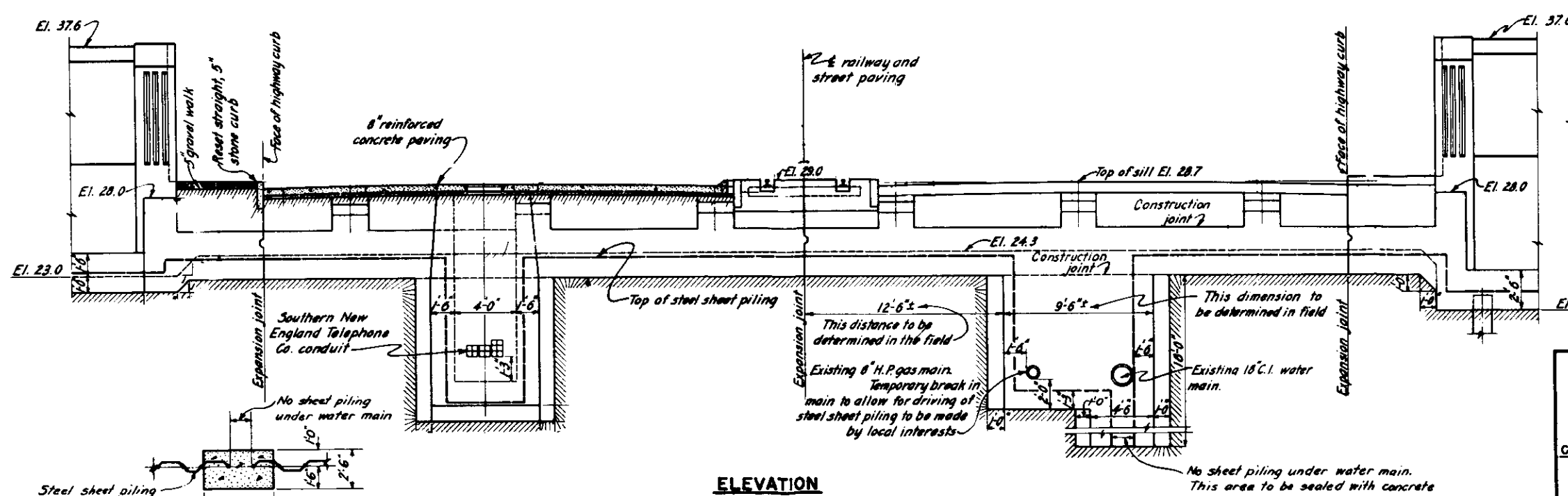
2 REQUIRED EST. WT. EACH 98 LBS.

SCALE: 1" = 1'-0"

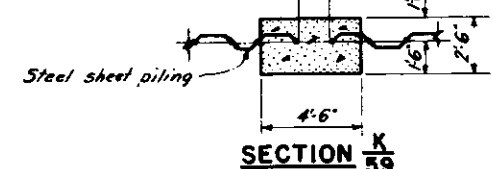
NOTES

Elevations refer to Mean Sea Level Datum.

SCALE: 1/4" = 1' F.T.



ELEVATION



SECTION K 59

CONNECTICUT RIVER FLOOD CONTROL
EAST HARTFORD DIKE
FLOOD EMERGENCY MOBILIZATION PLAN
MAIN STREET STOP-LOG STRUCTURE
CONNECTICUT RIVER CONNECTICUT
FLOOD EMERGENCY MOBILIZATION PLAN
PREPARED BY
CORPS OF ENGINEERS, U.S. ARMY
OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION, BOSTON, MASS.

SPRINGFIELD, MASSACHUSETTS

The flood protection system is made up of the following:

- 3,900 linear feet of earth dike
- 11,200 linear feet of concrete flood wall
- 16,000 linear feet of pressure conduit (Mill River)
- 6 pumping stations
- 7 stop-log structures
- 3 sandbag openings

Accompanying plans, profiles and typical sections show the system in detail, together with location of the various structures which require attention during a flood fight.

The above outline of the Springfield protection works does not include a section of wall approximately 3,200 feet long, extending from the Chicopee-Springfield town line north to high ground. This section of wall is an integral part of the system protecting the northern section of Springfield. While operation and maintenance are the responsibility of the City of Chicopee during flood periods, the two cities should coordinate their activities. Special attention should be given to closure of certain gate valves listed in the descriptive matter under the Chicopee works.

The pumping stations for control of storm water and domestic sewage were built and operated by the City of Springfield. Of these the York Street Pumping Station is in continuous operation for the purpose of pumping sanitary sewage under the river to the treatment plant located on Bondi Island. The other stations are as follows:

Washburn Street Station
Union Street Station
Rowland Avenue Station
Clinton Street Station
Phelps Avenue Station

The methods and sequence of operation in prosecuting a flood fight are set forth in detail in the Operation and Maintenance Manual for Flood Protection System, Springfield, Massachusetts, issued by this office and furnished to the City. The procedure, in general, is as follows:

- a. Closure of the 42" sluice gate at entrance chamber of siphon in Columbus Avenue sewer at Mill River.

February 1953

b. Closure of backwater gates, opening of gates to pumping station inlet chambers, and start of pumping operations at appropriate river elevations as shown on attached chart.

c. Inspection of all gated openings through flood walls or dikes to insure proper closure. (At Laurel Street sewer there is a gate on landside of wall and a flap valve in manhole on river side of wall).

d. Closure of stop-log and sandbag openings at elevations shown on attached charts. Materials and filled sandbags should be assembled in sufficient time to permit complete closure before flood waters reach the sill.

FLOOD-FREQUENCIES DURING MARCH - JUNE
based on records from 1843-1938, incl.

Frequency	Stage*	Elev. M.S.L.
Annual	13.5	50.8
2 years	15.5	52.8
5 years	17.8	55.1
10 years	19.3	56.6
20 years	20.6	57.9
50 years	22.2	59.5

*On the Memorial Bridge Gage, the zero of which is
Elevation 37.27' M.S.L.

PREVIOUS HIGH WATER ELEVATIONS
Elev. M.S.L.

Nov. 1927 Flood - Approximately	59.7
Mar. 1936 Flood - Approximately	65.9
Sep. 1938 Flood - Approximately	63.05
Dec. 1948 Flood - Approximately	56.4

ESTIMATED SANDBAG REQUIREMENTS	
Stop-logs and sandbag closures	5,000
Sand boils and sloughs	5,000
Raising wall one (1) foot	35,000
Raising dike one (1) foot	10,000
TOTAL	55,000

Recommended stock level for storage - 8,000 to 12,000
On hand 10 January 1954 - 7,500

February 1954

CITY OF SPRINGFIELD

Springfield
Exchange

Mayor: Daniel B. Brunton
City Hall
(Res.) 29 Kendall Street
6-2711
9-3190

Superintendent of Maintenance and Operation
of Flood Protection System: James J. Sullivan
Supt. of Streets &
Engineering
City Hall
(Res.) 96 Whittum Street
6-2711
9-4395

Deputy Supt. of Engineering: Richard E. Dudley
City Hall
(Res.) 32 Weber Street
6-2711
2-0353

Deputy Supt. of Sewers: George M. Granger
City Hall
(Res.) 784 White Street
6-2711
6-2945

Note: Mr. Granger has overall supervision of all
flood control work.

Sewage Treatment Plant Engineer:
City Hall
6-2711

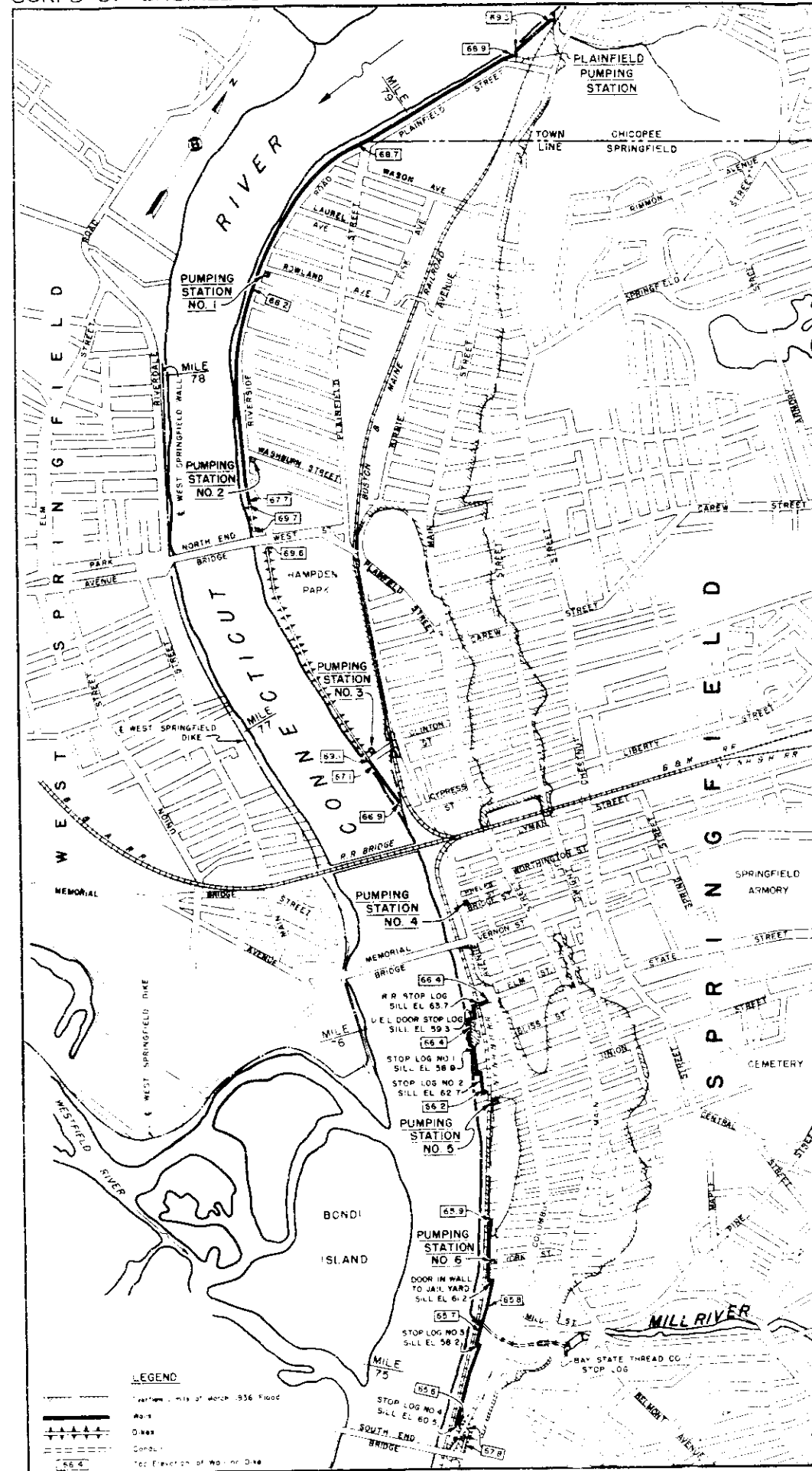
Note: Mr. Bicknell is directly in charge of all
flood control works under Mr. Granger's
supervision.

Washburn Street Pumping Station: 6-5325

York Street Pumping Station: 6-7410

Red Cross Headquarters: 275 Maple Street 7-4306

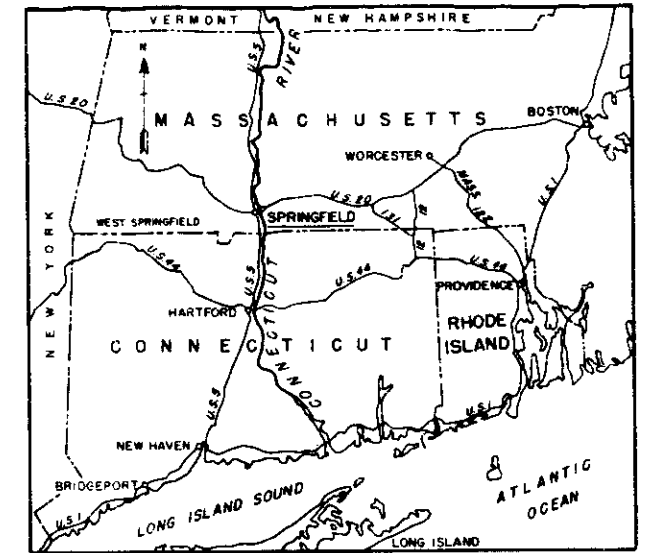
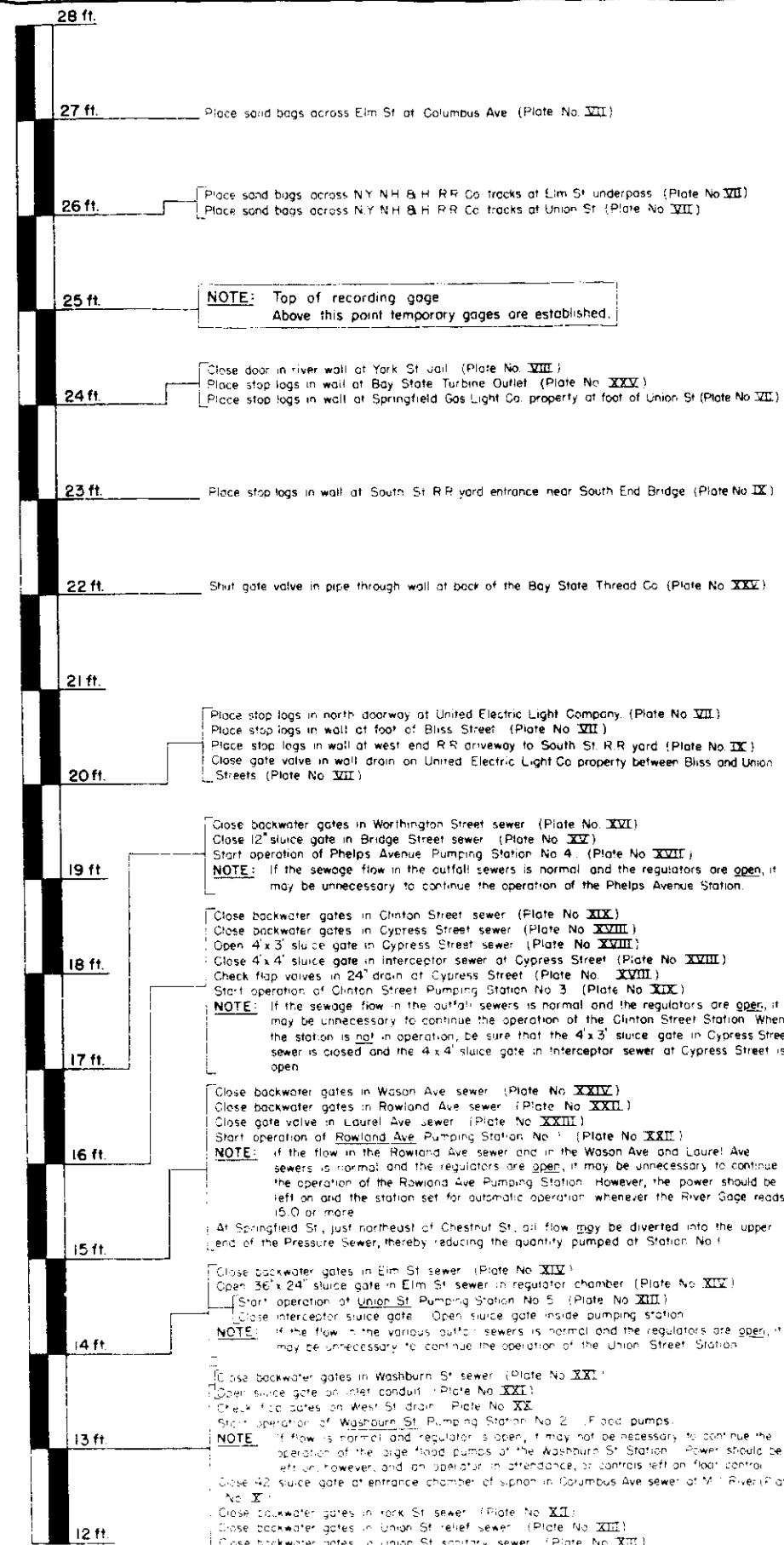
February 1953



CONNECTICUT RIVER GAGE

RECORDING GAGE LOCATED IN WESTERLY PIER
CENTER SPAN, MEMORIAL BRIDGE, SPRINGFIELD, MASS.
ZERO OF GAGE IS ELEVATION 37.3 MEAN SEA LEVEL

SCHEDULE OF OPERATIONS



LOCATION MAP

SCALE OF MILES
0 10 20 30

NOTES

STOP LOGS

When the elevation of the Connecticut River reaches El. 57.3 or river gage reads 20 feet, Stop Logs should be delivered at the following locations and should be in position when the river gage reaches the readings shown below.

- Gage 20 ft. (1) North doorway at United Electric Light Company Elev. 59.3
Gage 20 ft. (2) Riverwall at foot of Bliss St. Elev. 58.8
Gage 20 ft. (3) Riverwall at west end R.R. driveway to South St R.R. yard Elev. 58.2
Gage 23 ft. (4) South St R.R. yard entrance near South End Bridge Elev. 60.5
Gage 24 ft. (5) Riverwall at Spfld. Gas Light Co. foot of Union Street Elev. 62.7
Gage 24 ft. (6) Wall at turbine outlets Bay State Thread Co

SAND BAGS

Sand bags should be filled and delivered to the following locations when the river reaches elevation 57.3 or the river gage reads 20.0

SAND BAGS SHOULD BE PLACED IN POSITION AT RIVER GAGE READINGS SHOWN BELOW

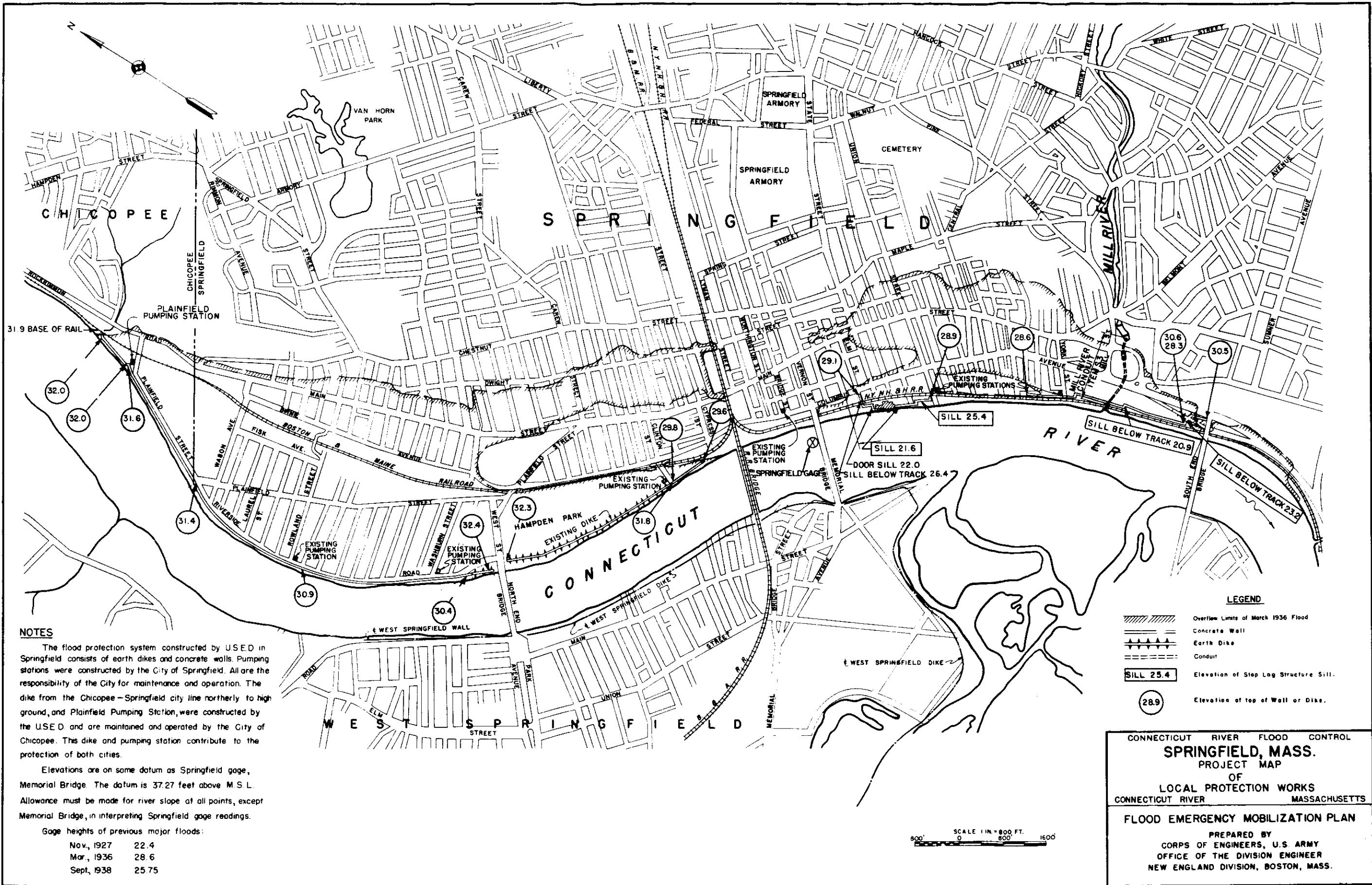
- Gage 20 ft. (1) Riverwall at foot of Bliss Street
Gage 20 ft. (2) Riverwall at west end of R.R. driveway to South St R.R. yard
Gage 23 ft. (3) South St R.R. yard entrance near South End Bridge
Gage 24 ft. (4) Door in Riverwall at York St Jail
Gage 24 ft. (5) Riverwall at Spfld. Gas Light Co., foot of Union St
Gage 26 ft. (6) N.Y. N.H. & H. R.R. Co. tracks at Elm St underpass
Gage 26 ft. (7) N.Y. N.H. & H. R.R. Co. tracks at Union Street
Gage 27 ft. (8) Elm Street at Columbus Avenue

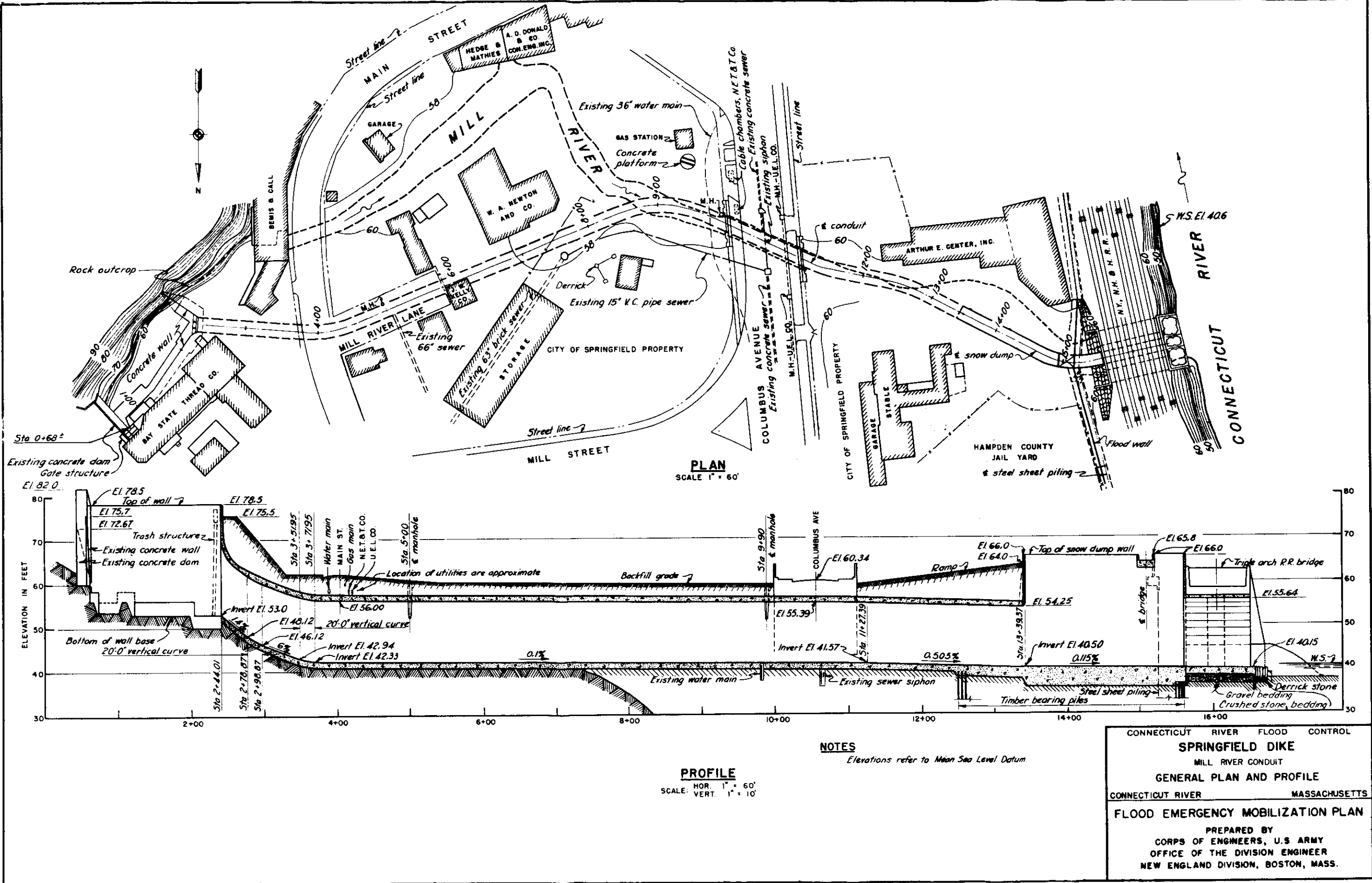
CONNECTICUT RIVER FLOOD CONTROL
FLOOD PROTECTION SYSTEM
SPRINGFIELD, MASS.
OPERATIONS CHART

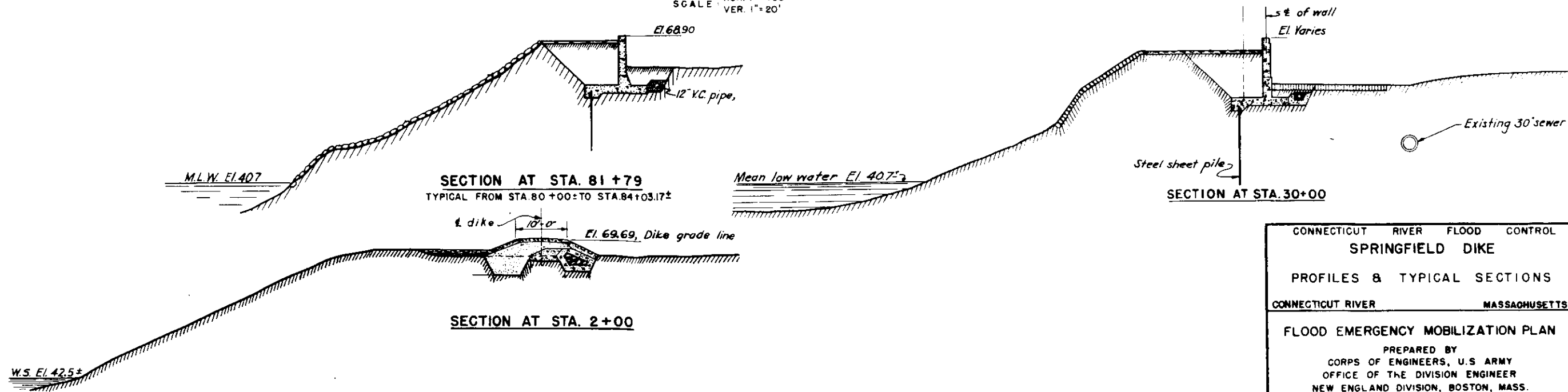
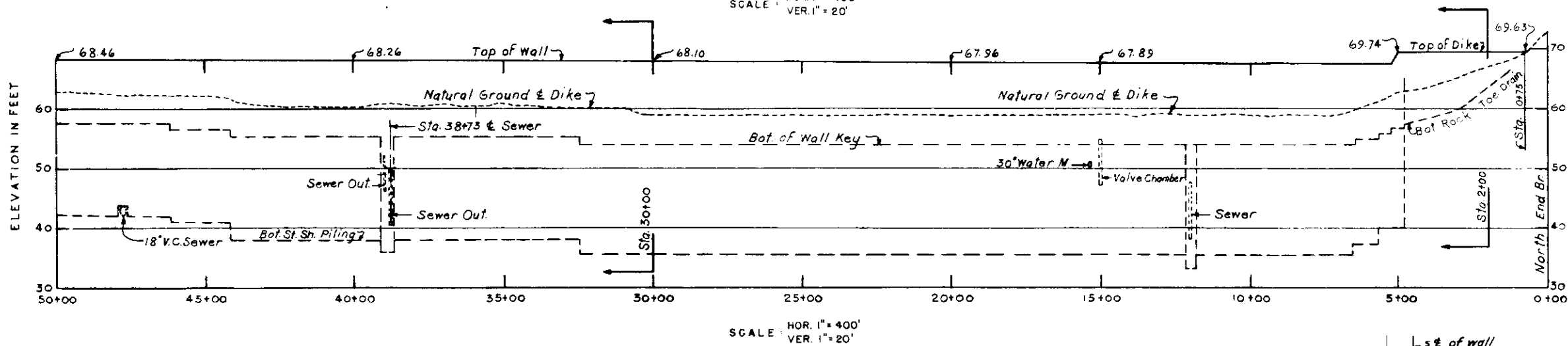
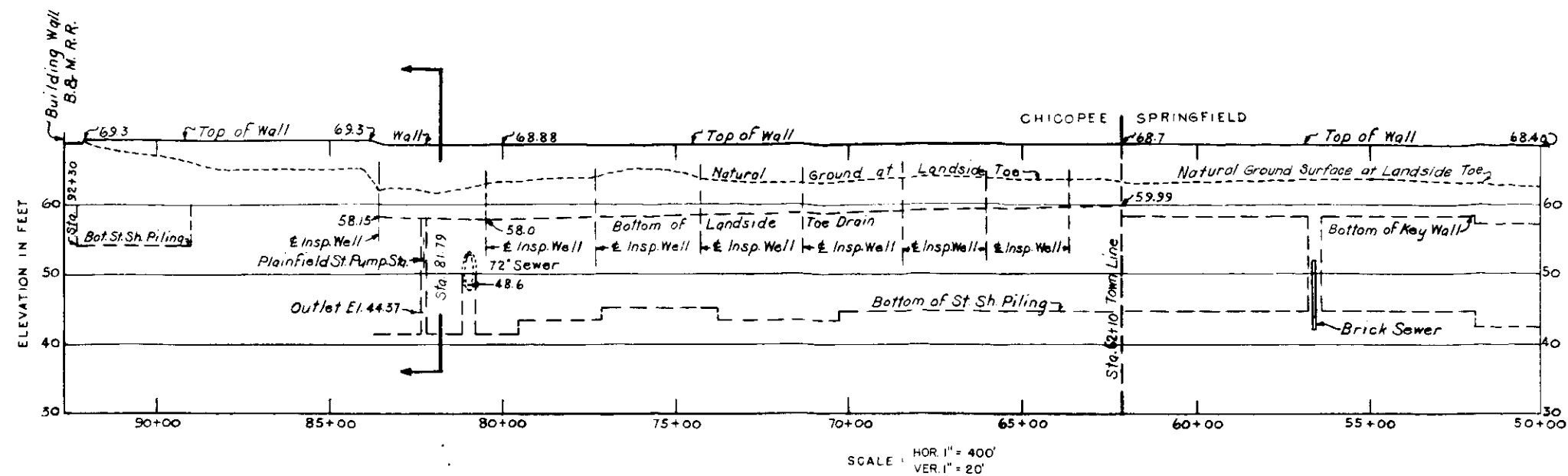
IN SHEETS SCALE 1" = 100 FT SHEET NO. 1
NEW ENGLAND DIVISION, BOSTON, MASS.

FLOOD EMERGENCY MOBILIZATION PLAN

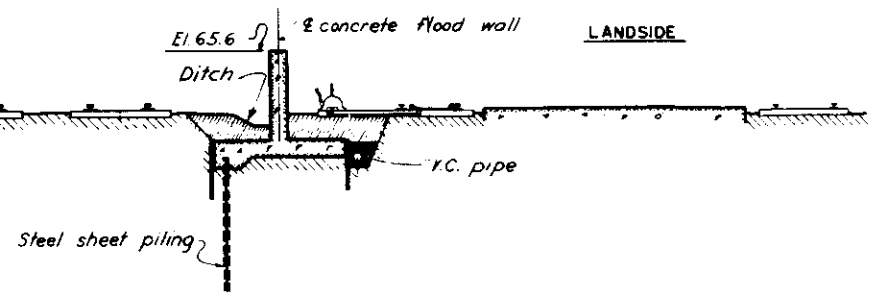
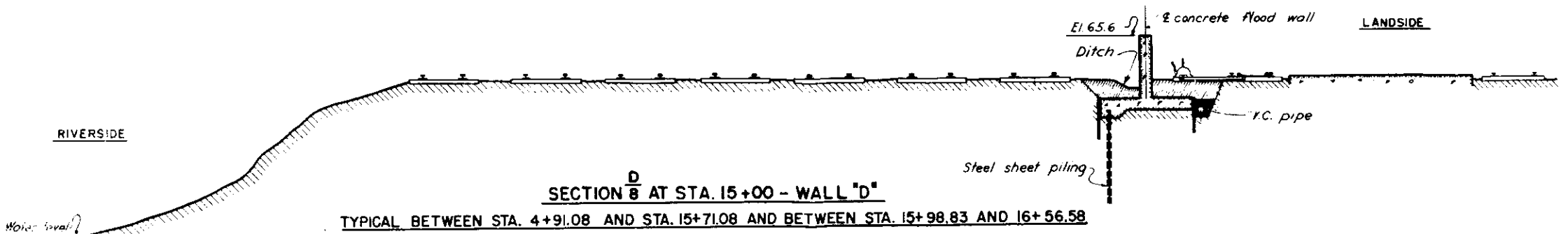
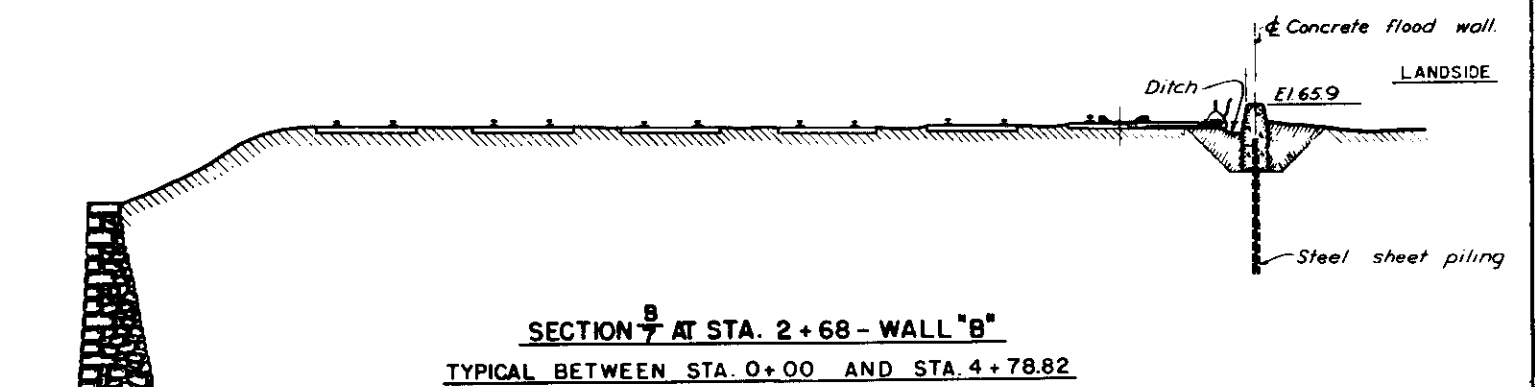
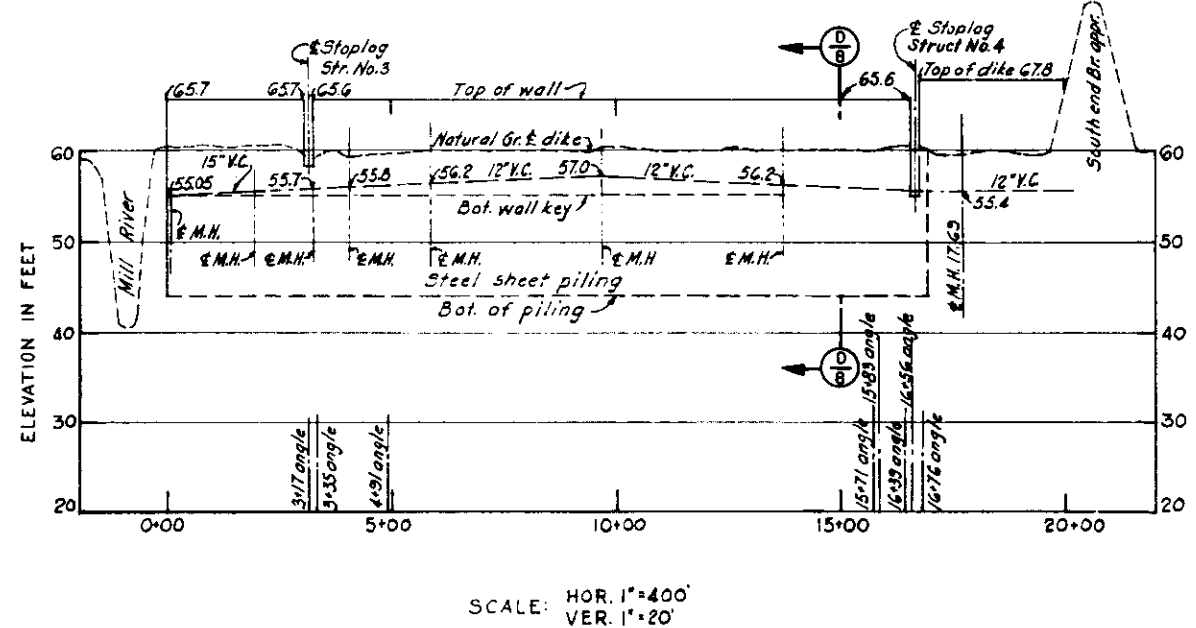
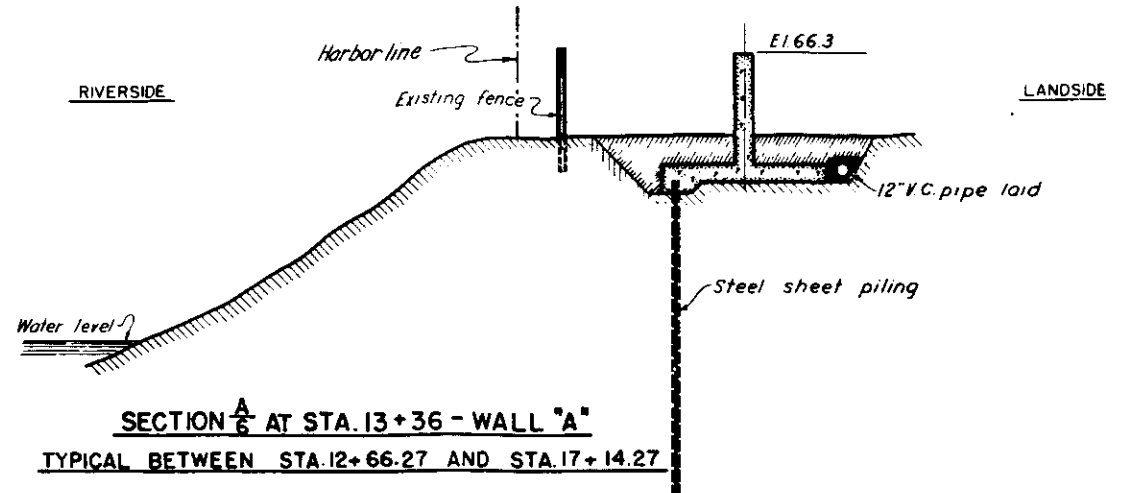
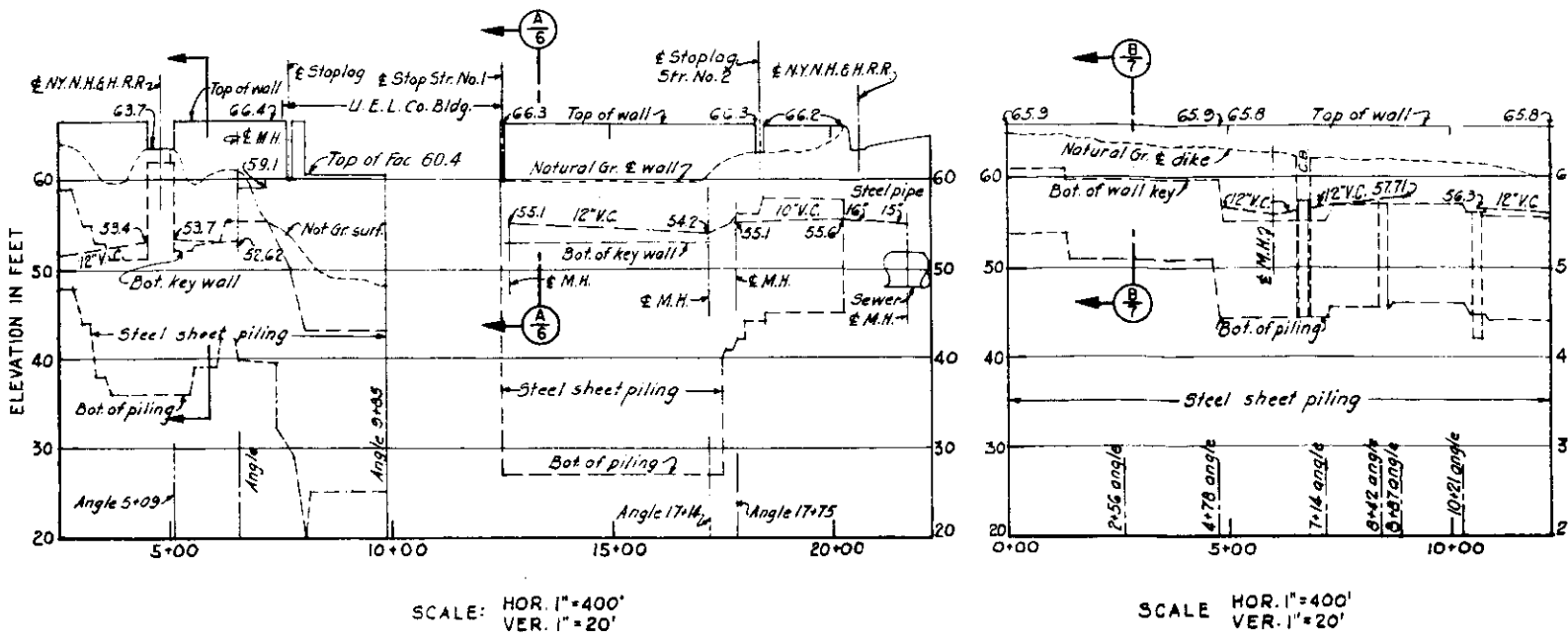
FILE NO. CT-4-3443



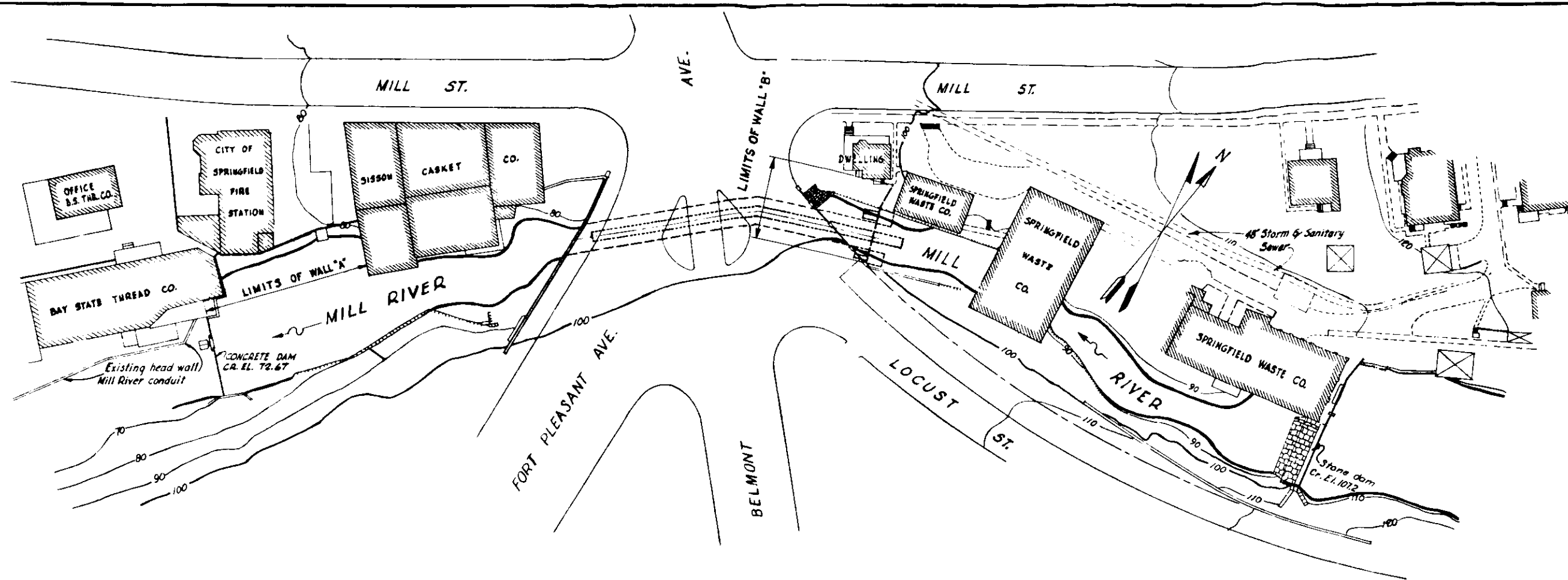




CONNECTICUT RIVER FLOOD CONTROL
SPRINGFIELD DIKE
PROFILES & TYPICAL SECTIONS
CONNECTICUT RIVER MASSACHUSETTS
FLOOD EMERGENCY MOBILIZATION PLAN
PREPARED BY
CORPS OF ENGINEERS, U.S. ARMY
OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION, BOSTON, MASS.

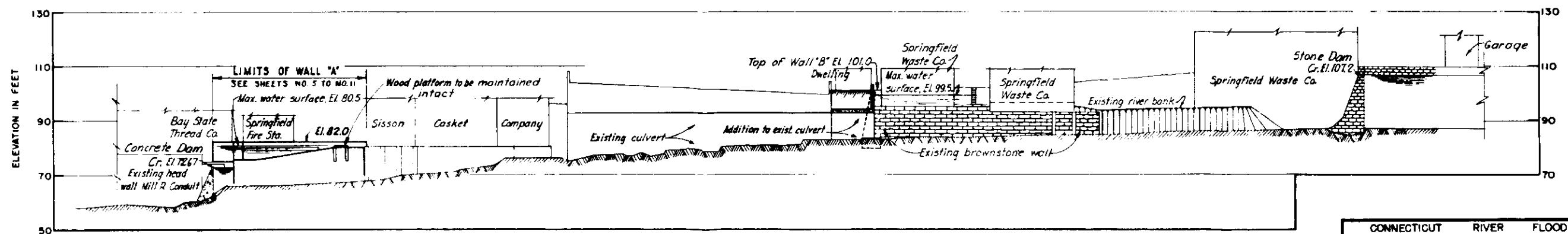


CONNECTICUT RIVER FLOOD CONTROL
SPRINGFIELD DIKE
PROFILES & TYPICAL SECTIONS
CONNECTICUT RIVER MASSACHUSETTS
FLOOD EMERGENCY MOBILIZATION PLAN
PREPARED BY
CORPS OF ENGINEERS, U.S. ARMY
OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION, BOSTON, MASS.



PLAN

SCALE: 1" = 40'



PROFILE ALONG C OF MILL RIVER

SCALE: HOR. 1" = 40'
VERT. 1" = 20'

NOTE:

Elevations refer to Mean Sea Level datum.

CONNECTICUT RIVER FLOOD CONTROL
MILL RIVER FLOOD WALLS
 SPRINGFIELD, MASS.
 GENERAL PLAN AND PROFILE
 MILL RIVER MASSACHUSETTS
FLOOD EMERGENCY MOBILIZATION PLAN
 PREPARED BY
 CORPS OF ENGINEERS, U.S. ARMY
 OFFICE OF THE DIVISION ENGINEER
 NEW ENGLAND DIVISION, BOSTON, MASS.

WEST SPRINGFIELD, MASSACHUSETTS

The flood protection system for West Springfield is composed of two separate and independent systems. The main section commences at high ground on the West Bank of the Connecticut River near Harrison Place and extends southerly along the river about two miles to the confluence of the Westfield River, and thence northwesterly about two and one-half miles along the Westfield River. This system is composed of the following:

- 4,800 linear feet of concrete flood walls
- 15,000 linear feet of earth dike
- 3 pumping stations
- 3 stop-log structures
- 14 drainage structures through walls

The method and sequence of operations in prosecuting a flood fight are set forth in detail in the Operation and Maintenance Manual for Flood Protective Works, West Springfield, Mass., recently revised. More revised sheets for that manual will be furnished upon completion of the relocation of Highway U. S. 5. Construction openings through the dike and wall should be closed in advance of threat of floods.

The procedure in general at time of flood consists of checking flap valves, closing valves, installing stop-logs, manning pumping stations and patrolling dikes in the sequence and at the river stages as shown on the attached Project Map.

Systematic and thorough patrolling of dikes, in accordance with paragraph 4-04 (c) is particularly important in the West Springfield area and must include careful examination of the area along the Westfield River downstream of the Agawam Bridge where the dike system has been supplemented by 171 foundation relief wells located on the landslide of the dikes and discharging through the Circuit Avenue Pumping Station.

The other flood protective system is around the Riverdale section of West Springfield. This system is composed essentially of the following:

- 13,000 linear feet of earth dike
- 2 pumping stations
- 3 stop-log structures
- 8 drainage structures through walls

The operation of the Riverdale System will consist of closing three stop-log structures--two of which will block Route 5--of closing gates, manning pumping stations and patrolling dikes in the sequence and at the river stages as shown on the Riverdale Project Map.

February 1954

Elevations currently used in operation of the West Springfield System refer to Mean Sea Level (M.S.L.). The zero of the Springfield Gage at Memorial Bridge is 37.27 feet above M.S.L. The grades of dikes and walls as given on following maps refer to M.S.L. unless otherwise noted.

FLOOD FREQUENCIES DURING MARCH-JUNE
Based on records from 1843 - 1938, incl.

<u>Frequency</u>	<u>Stage*</u>	<u>M.S.L.</u>
Annual	13.5	50.8
2 years	15.5	52.8
5 years	17.8	55.1
10 years	19.3	56.6
20 years	20.6	57.9
50 years	22.2	59.5

* On the Memorial Bridge Gage, the zero of which is Elevation 37.27 feet M.S.L.

PREVIOUS HIGH WATER ELEVATION

Elevation M.S.L.

Nov. 1927 Flood - approximately.....59.7
Mar. 1936 Flood - approximately.....65.9
Sep. 1938 Flood - approximately.....63.0
Dec. 1948 Flood - approximately.....56.4

ESTIMATED SANDBAG REQUIREMENTS

Stop-log closures 2,000
Sand boils and sloughs 7,000
Raising wall one (1) foot 7,000
Raising dike one (1) foot 90,000

TOTAL 106,000

Recommended stock level for storage - 5,000 to 7,000

On hand 10 January 1954 - 4,000

February 1954

TOWN OF WEST SPRINGFIELD

	<u>Springfield Exchange</u>
<u>Board of Selectmen and Town Engineer:</u>	3-7831 Ext. 22
<u>Chairman of Board of Selectmen:</u> Charles B. Hegeman (res.) 695 Dewey Street	2-9600
<u>Superintendent of Maintenance and Operation of Flood Protection System:</u> T. Fred Roche Supt. of Highways 126 Park Street (Res.) 117 Craiwell Ave.	3-7831 Ext. 42 6-2966
<u>Pumping Station Operator:</u> Lewis Phelps (Res.) 572 Westfield Street	2-6632
<u>Bridge Street Pumping Station:</u>	3-7831 Ext. 30
<u>Red Cross Headquarters:</u>	7-1703

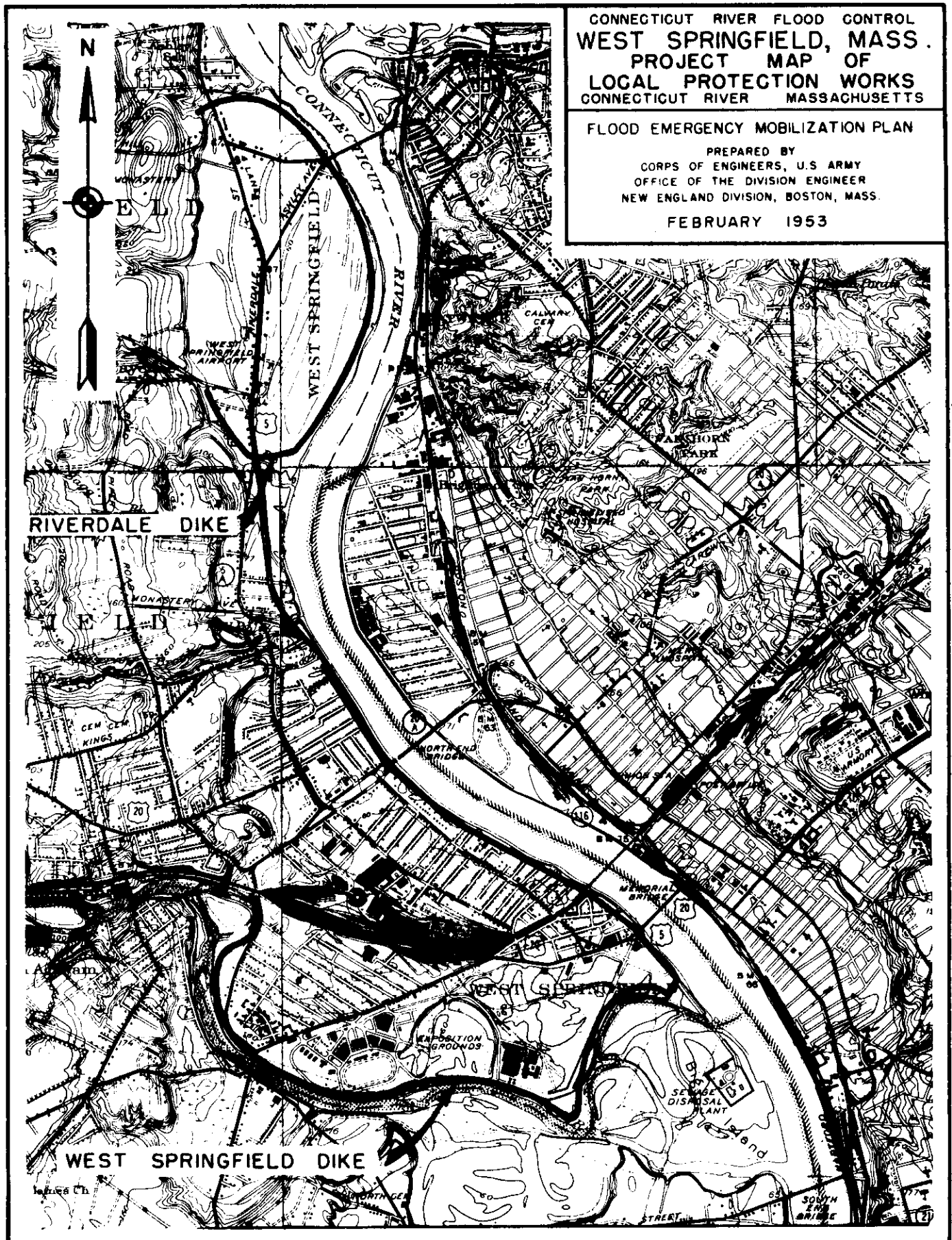
February 1954

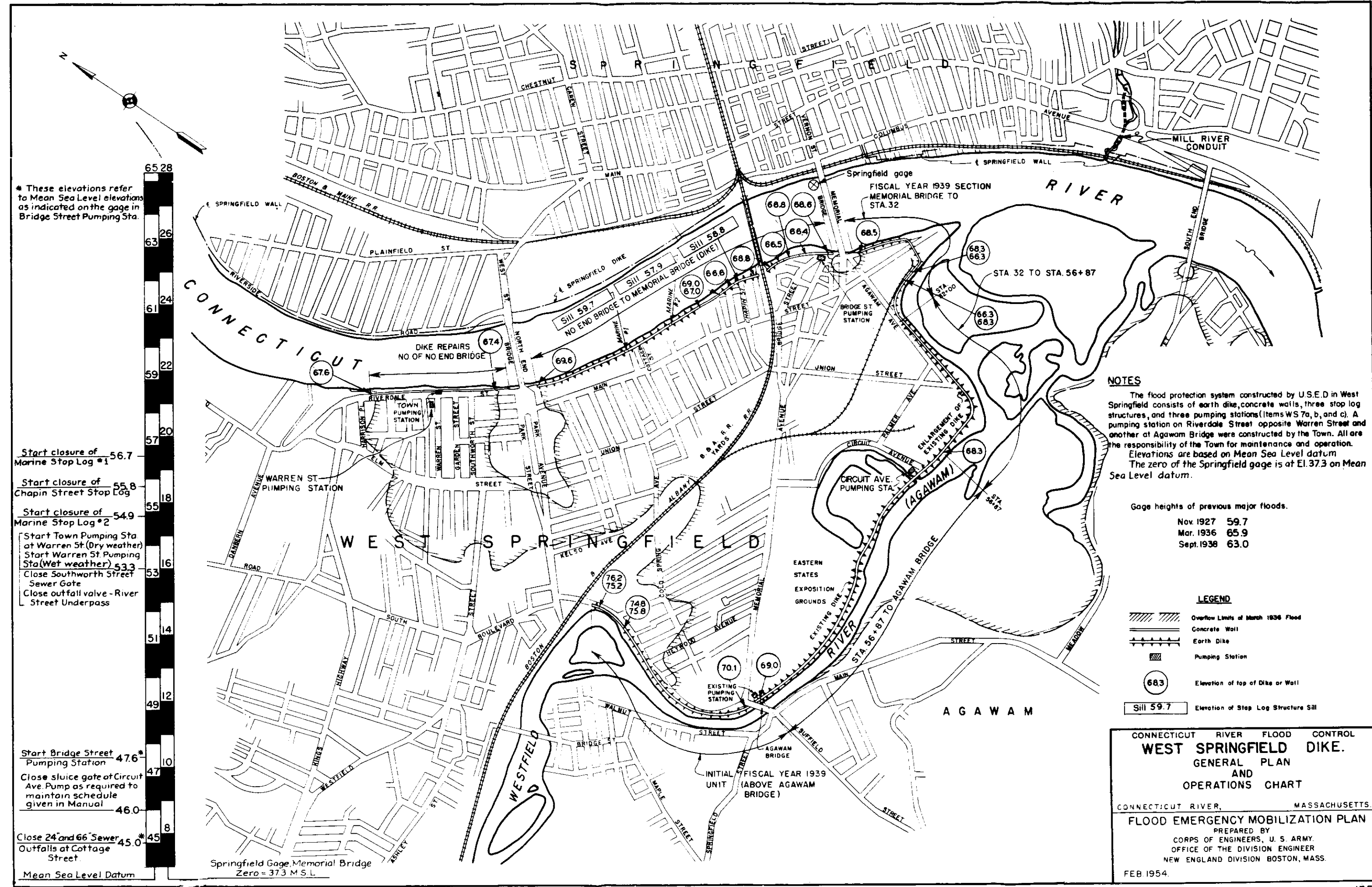
CONNECTICUT RIVER FLOOD CONTROL
WEST SPRINGFIELD, MASS.
PROJECT MAP OF
LOCAL PROTECTION WORKS
CONNECTICUT RIVER MASSACHUSETTS

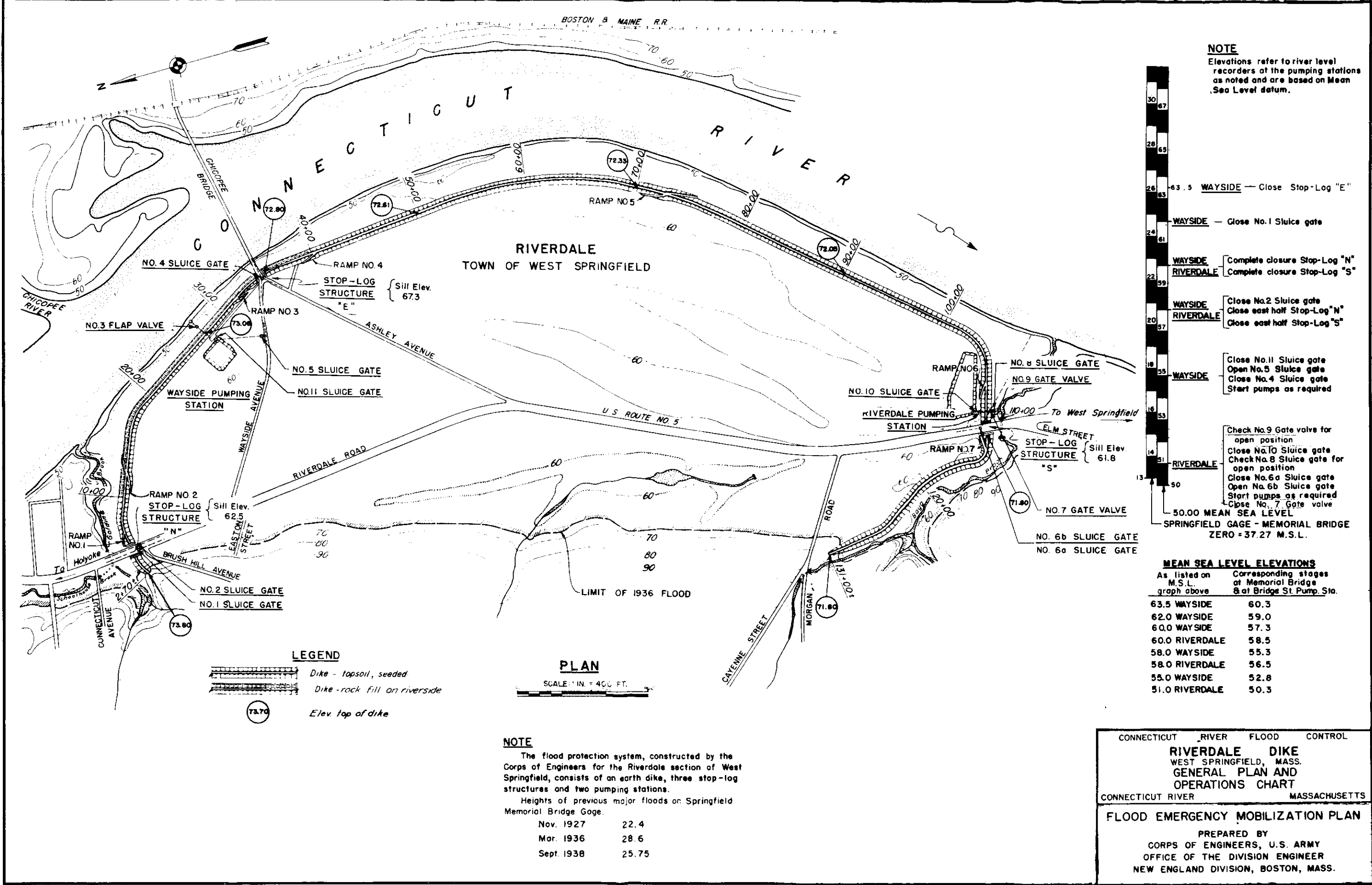
FLOOD EMERGENCY MOBILIZATION PLAN

PREPARED BY
CORPS OF ENGINEERS, U.S. ARMY
OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION, BOSTON, MASS.

FEBRUARY 1953







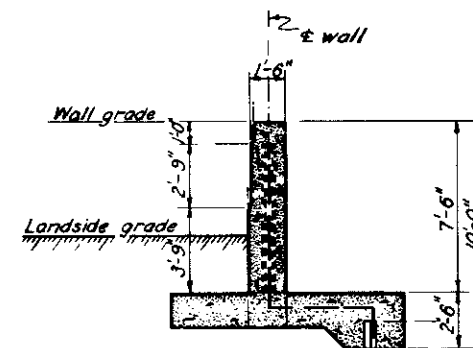
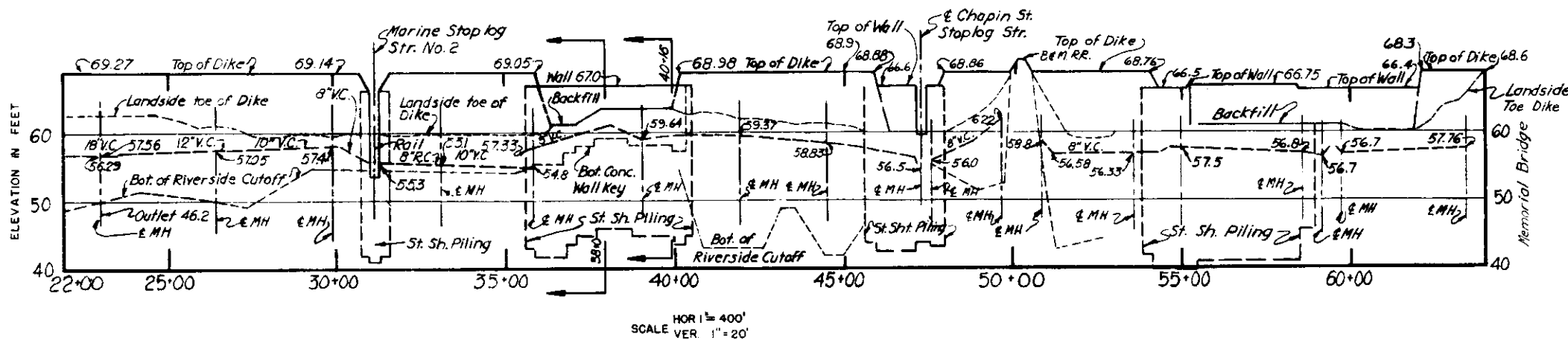
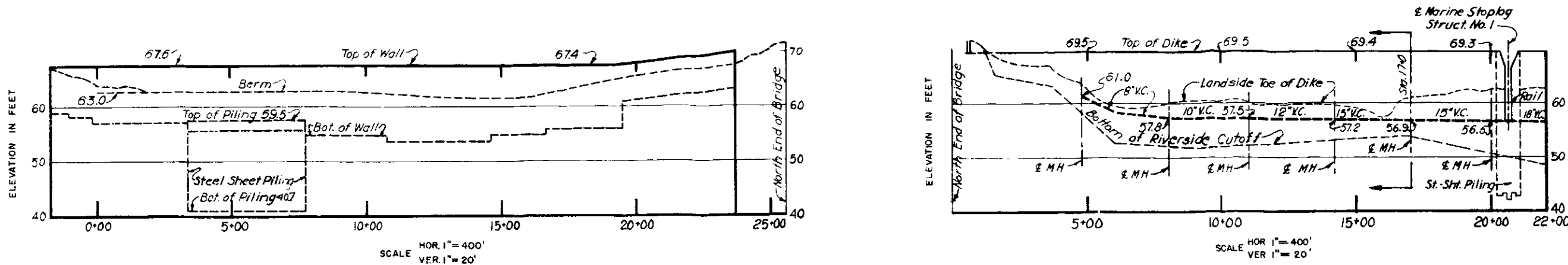
NOTE
Elevations refer to river level
recorders at the pumping stations
as noted and are based on Mean
Sea Level datum.

- 63.5 WAYSIDE — Close Stop-Log "E"
- WAYSIDE — Close No. 1 Sluice gate
- WAYSIDE RIVERDALE — Complete closure Stop-Log "N"
- WAYSIDE RIVERDALE — Complete closure Stop-Log "S"
- WAYSIDE RIVERDALE — Close No. 2 Sluice gate
- WAYSIDE RIVERDALE — Close east half Stop-Log "N"
- WAYSIDE RIVERDALE — Close east half Stop-Log "S"
- WAYSIDE — Close No. 11 Sluice gate
- WAYSIDE — Open No. 5 Sluice gate
- WAYSIDE — Close No. 4 Sluice gate
- WAYSIDE — Start pumps as required
- WAYSIDE — Check No. 9 Gate valve for open position
- WAYSIDE — Close No. 10 Sluice gate
- WAYSIDE — Check No. 8 Sluice gate for open position
- WAYSIDE — Close No. 6a Sluice gate
- WAYSIDE — Open No. 6b Sluice gate
- WAYSIDE — Start pumps as required
- WAYSIDE — Close No. 7 Gate valve
- WAYSIDE — 50.00 MEAN SEA LEVEL
- WAYSIDE — SPRINGFIELD GAGE - MEMORIAL BRIDGE ZERO = 37.27 M.S.L.

MEAN SEA LEVEL ELEVATIONS	
As listed on M.S.L. graph above	Corresponding stages at Memorial Bridge & at Bridge St. Pump. Sta.
63.5 WAYSIDE	60.3
62.0 WAYSIDE	59.0
60.0 WAYSIDE	57.3
60.0 RIVERDALE	58.5
58.0 WAYSIDE	55.3
58.0 RIVERDALE	56.5
55.0 WAYSIDE	52.8
51.0 RIVERDALE	50.3

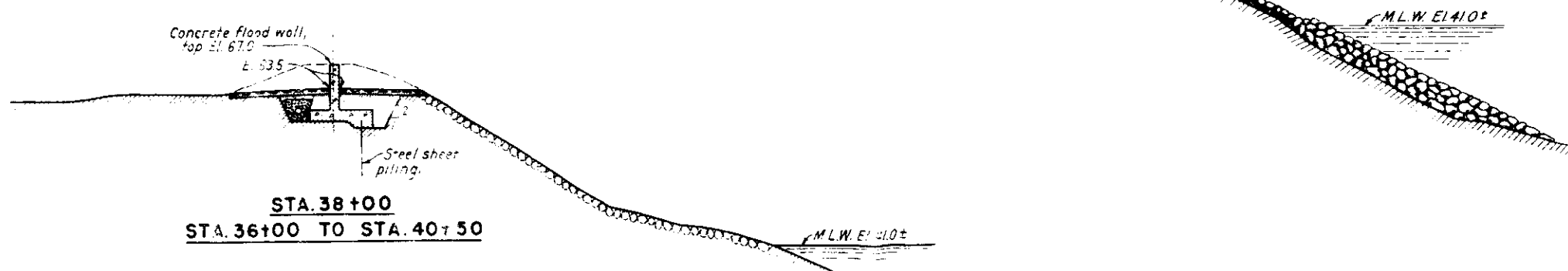
NOTE
The flood protection system, constructed by the Corps of Engineers for the Riverdale section of West Springfield, consists of an earth dike, three stop-log structures and two pumping stations.
Heights of previous major floods on Springfield Memorial Bridge Gage.
Nov. 1927 22.4
Mar. 1936 28.6
Sept. 1938 25.75

CONNECTICUT RIVER FLOOD CONTROL
RIVERDALE DIKE
WEST SPRINGFIELD, MASS.
GENERAL PLAN AND OPERATIONS CHART
CONNECTICUT RIVER MASSACHUSETTS
FLOOD EMERGENCY MOBILIZATION PLAN
PREPARED BY
CORPS OF ENGINEERS, U.S. ARMY
OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION, BOSTON, MASS.



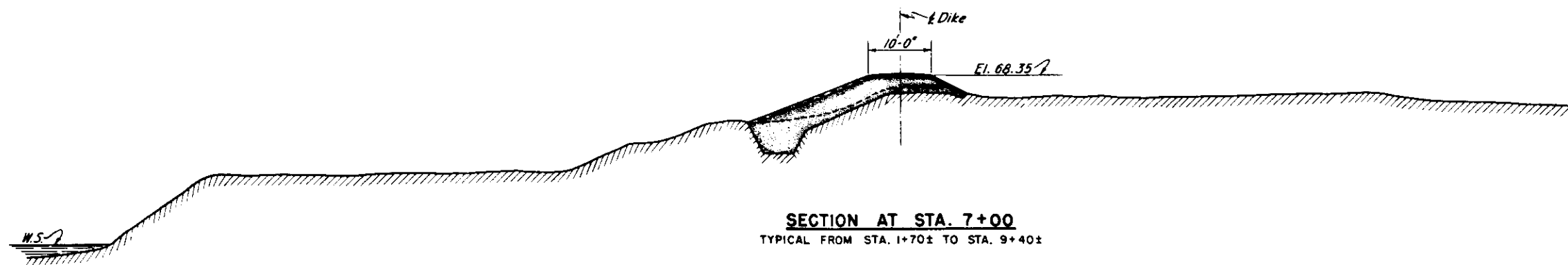
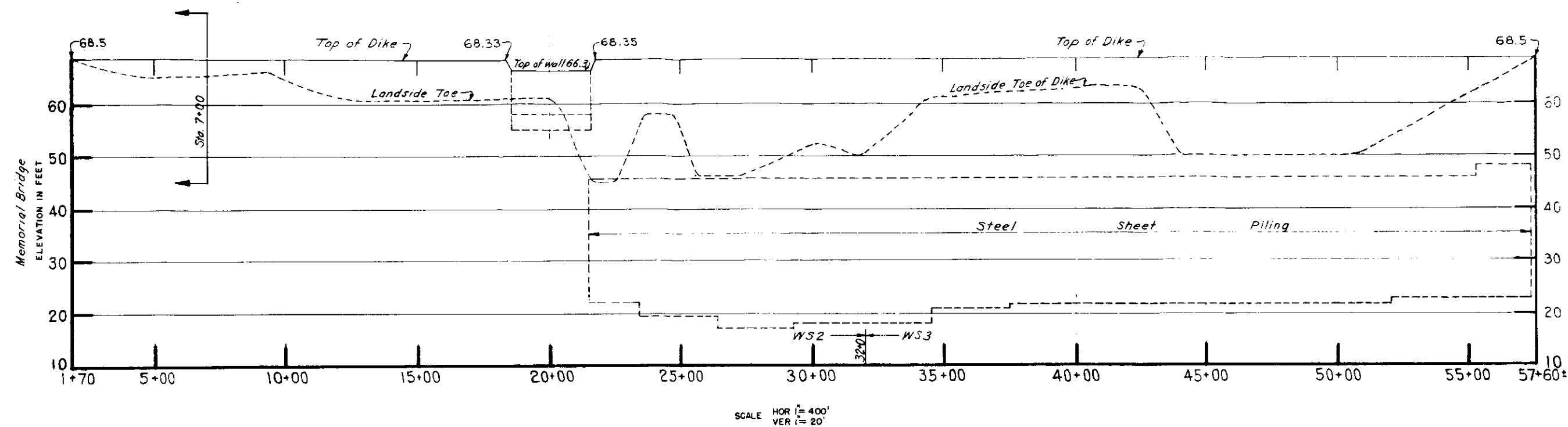
7'-6" WALL SECTION

SECTION AT STA. 17+00
TYPICAL FROM STA. 9+00 TO STA. 17+00

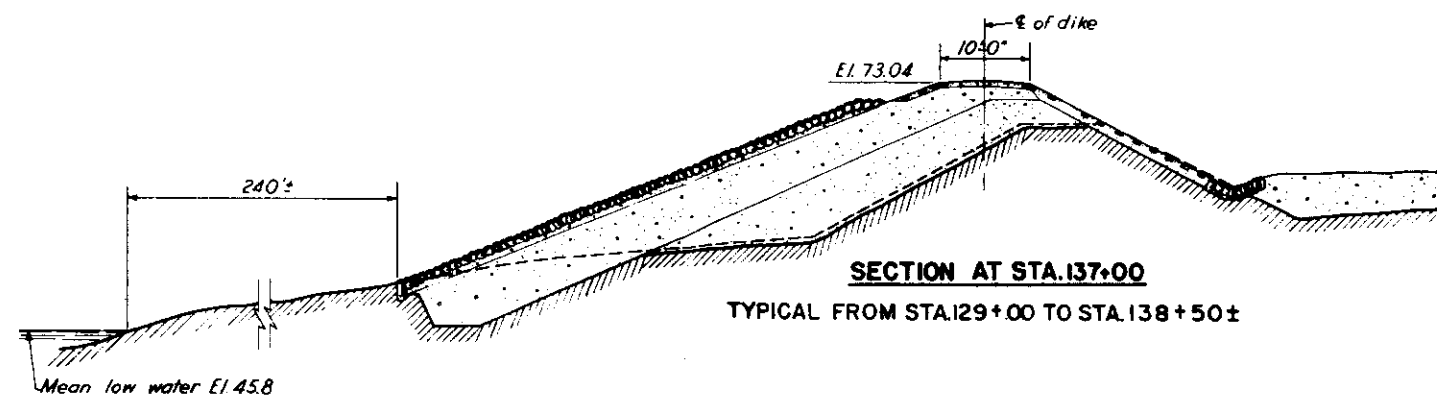
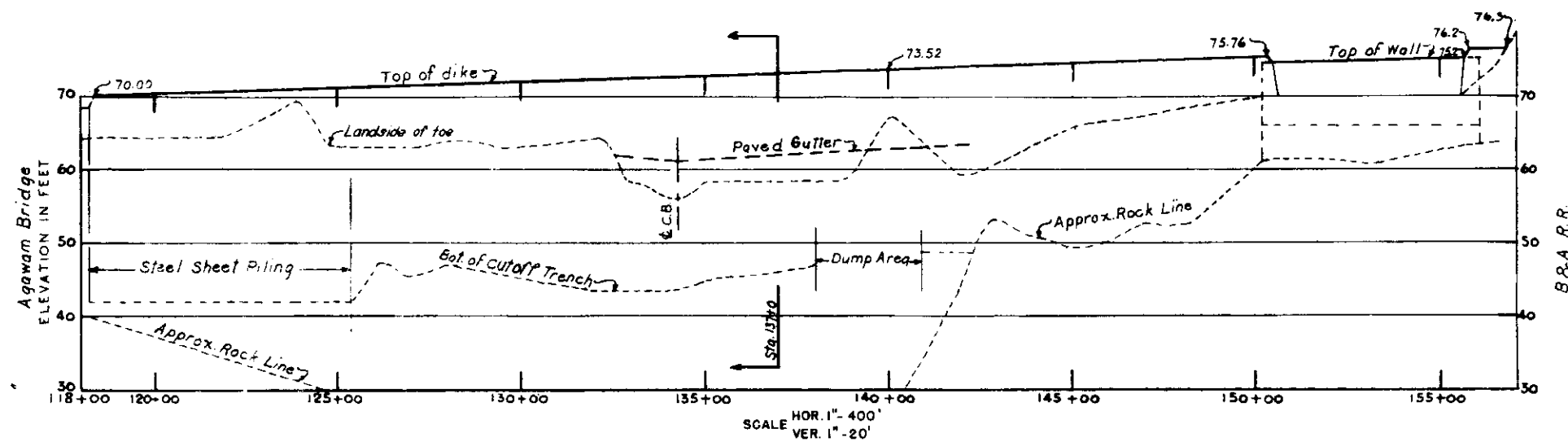
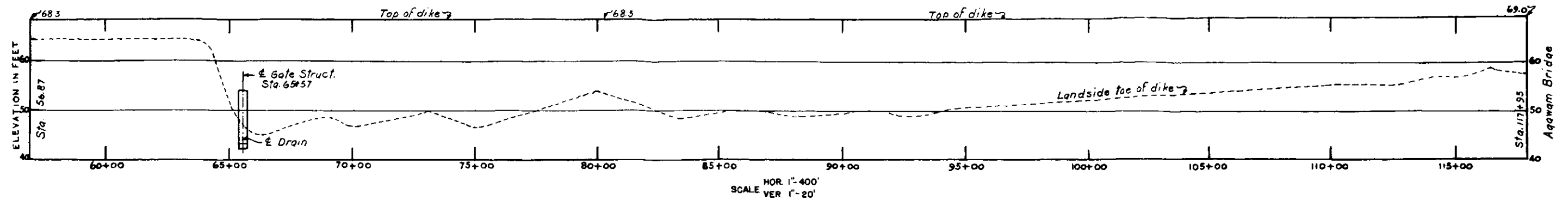


STA. 38+00
STA. 36+00 TO STA. 40+00

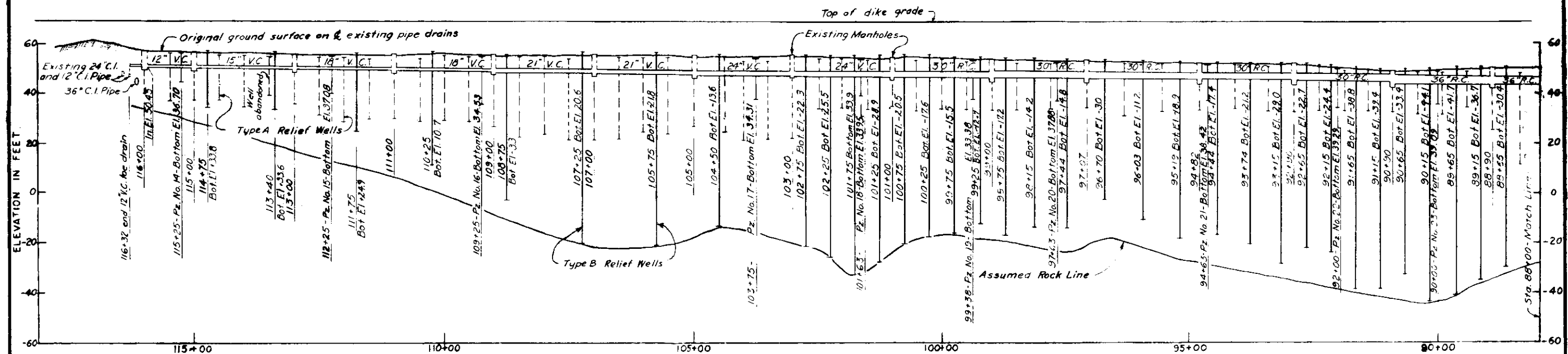
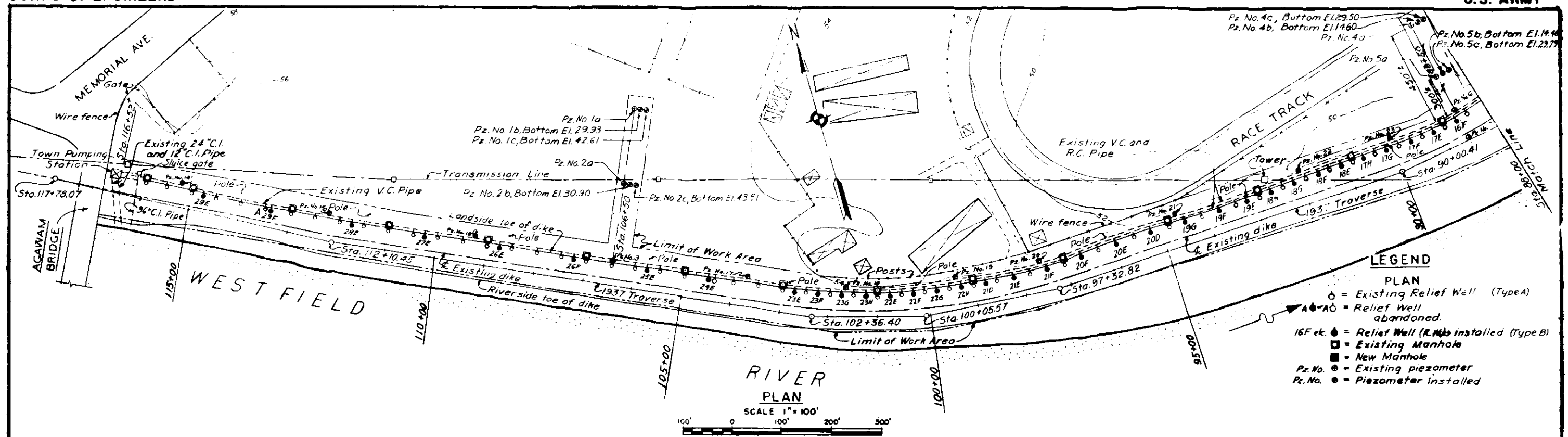
CONNECTICUT RIVER FLOOD CONTROL
WEST SPRINGFIELD DIKE
PROFILES & TYPICAL SECTIONS
CONNECTICUT & WESTFIELD RIVER MASSACHUSETTS
FLOOD EMERGENCY MOBILIZATION PLAN
PREPARED BY
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CONNECTICUT RIVER FLOOD CONTROL
WEST SPRINGFIELD DIKE
PROFILES & TYPICAL SECTIONS
CONNECTICUT & WESTFIELD RIVERS MASSACHUSETTS
FLOOD EMERGENCY MOBILIZATION PLAN
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CONNECTICUT RIVER FLOOD CONTROL
WEST SPRINGFIELD DIKE
PROFILES & TYPICAL SECTIONS
CONNECTICUT & WESTFIELD RIVERS MASSACHUSETTS
FLOOD EMERGENCY MOBILIZATION PLAN
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**NOTES**

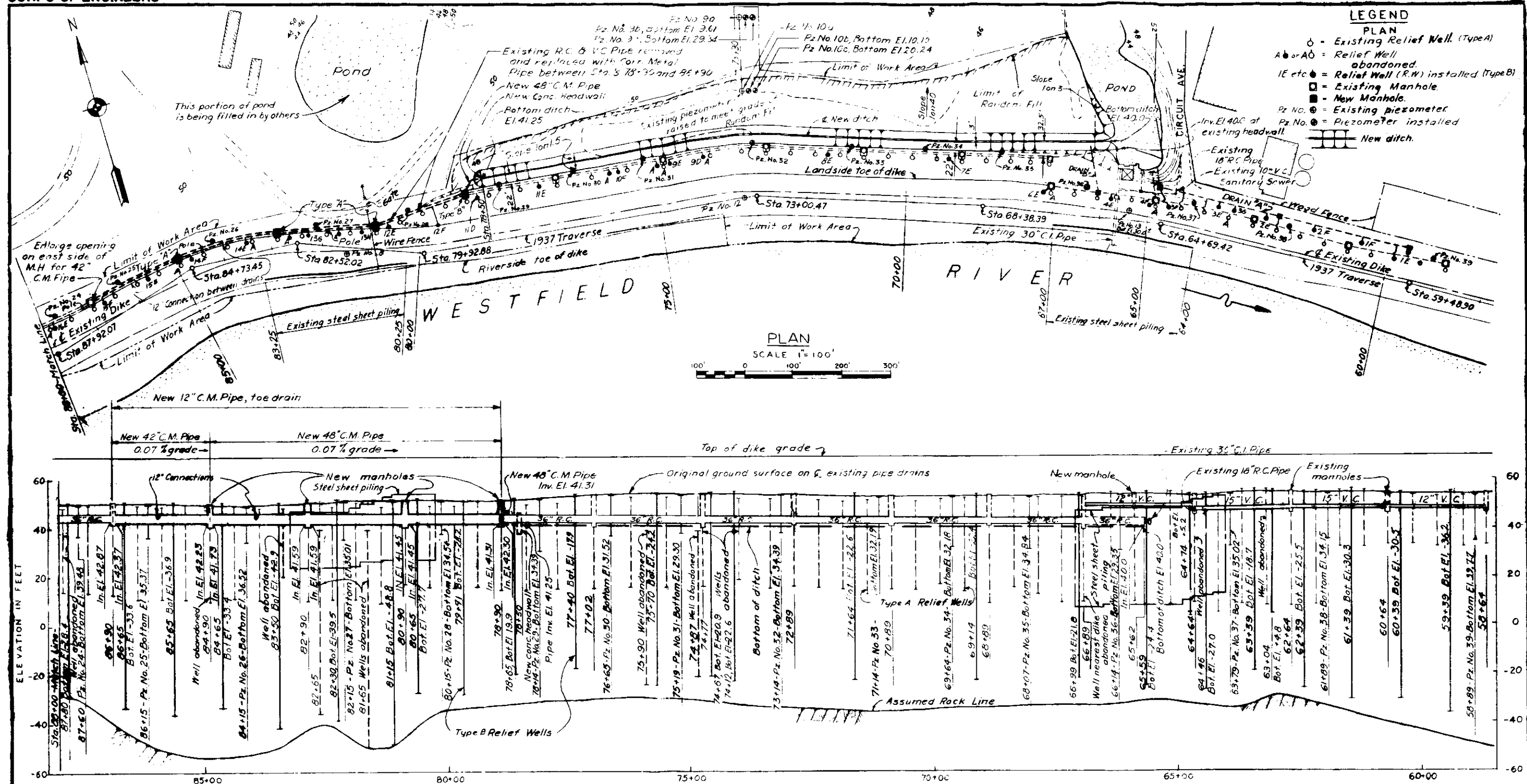
Elevation refers to Mean Sea Level Datum.
Contour interval, two feet.

CONNECTICUT RIVER FLOOD CONTROL
WEST SPRINGFIELD DIKE
STA 56+87 TO AGAWAM BRIDGE
FOUNDATION TREATMENT
PLAN AND PROFILE NO. 1

WESTFIELD RIVER MASSACHUSETTS

FLOOD EMERGENCY MOBILIZATION PLAN

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NEW ENGLAND DIVISION, BOSTON, MASS.
FEB. 1954.



CONNECTICUT RIVER FLOOD CONTROL
WEST SPRINGFIELD DIKE
 STA 56+87 TO AGAWAM BRIDGE
 FOUNDATION TREATMENT
 PLAN AND PROFILE NO. 2

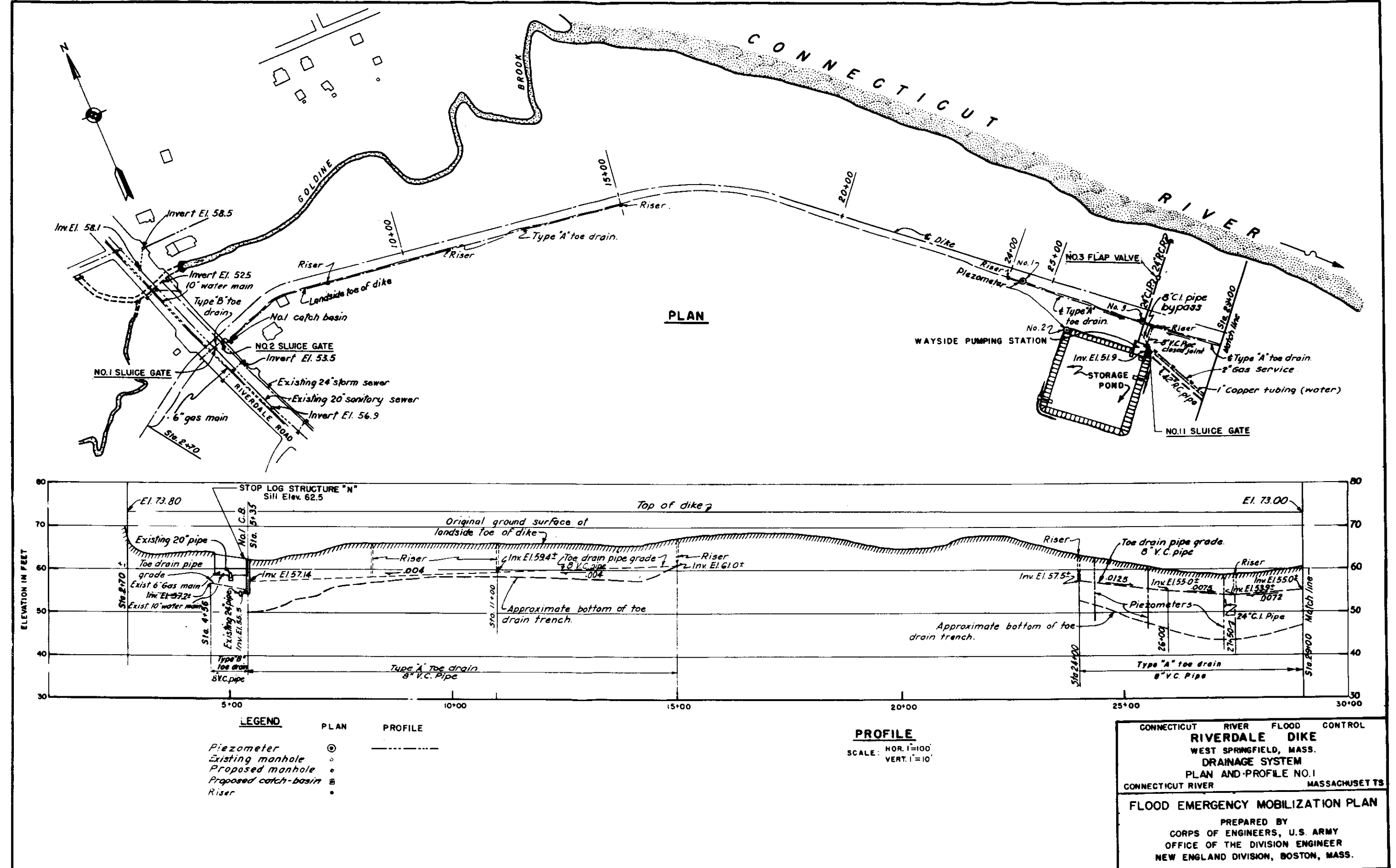
WESTFIELD RIVER MASSACHUSETTS

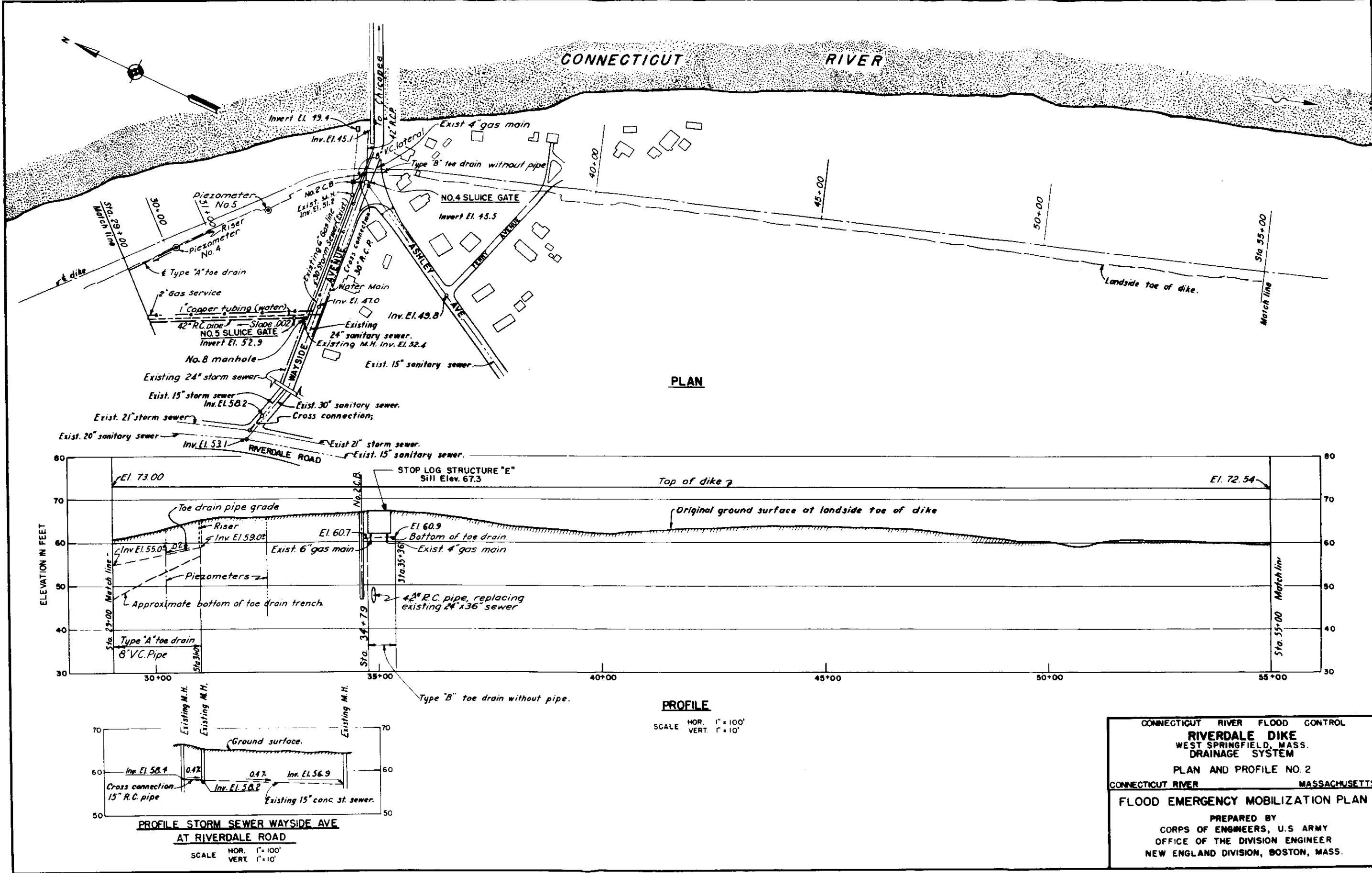
FLOOD EMERGENCY MOBILIZATION PLAN

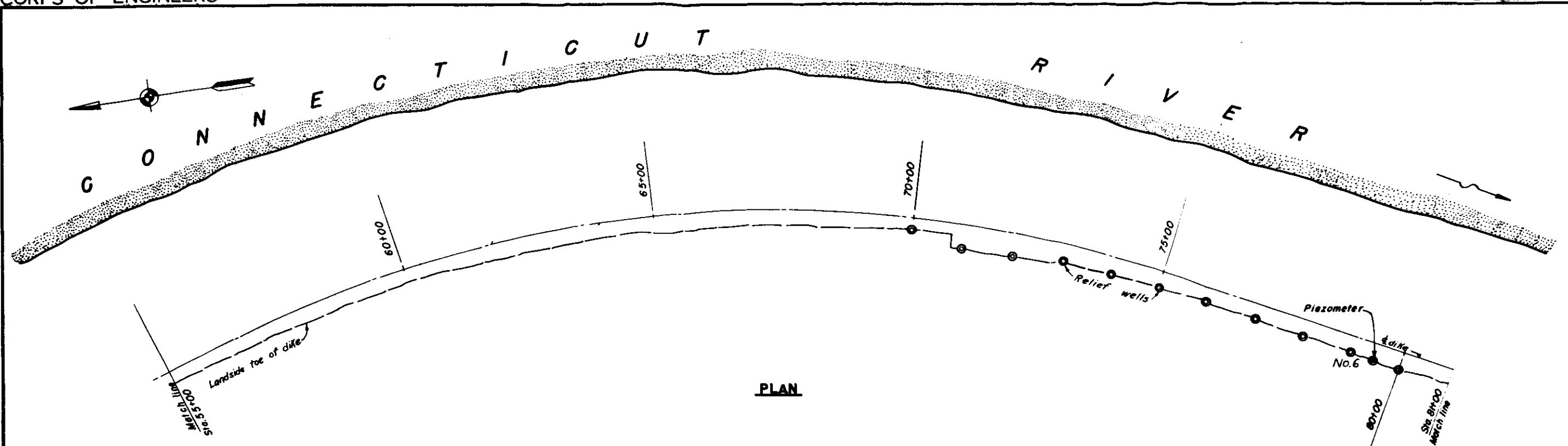
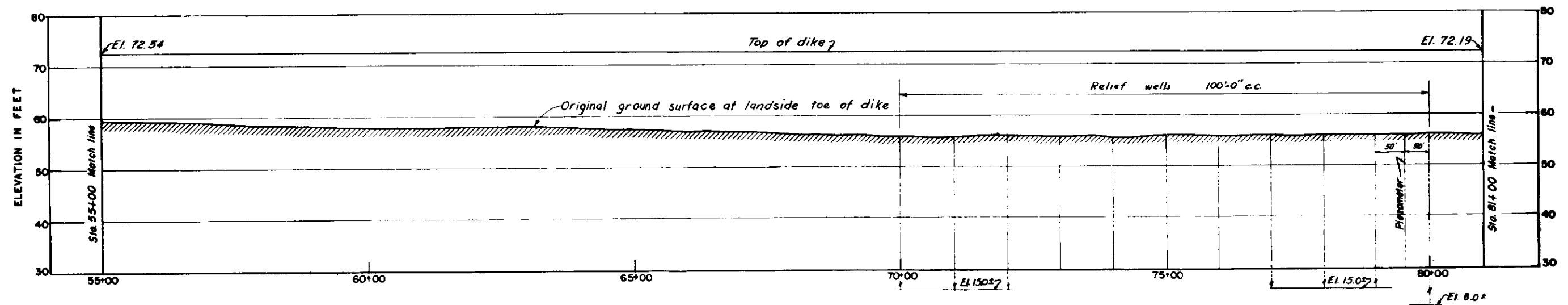
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* TOP OF COUPLING OR F RE AS APPLICABLE

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FEB. 1954.





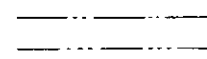
PLANLEGEND

Relief wells
Piezometer

PLAN

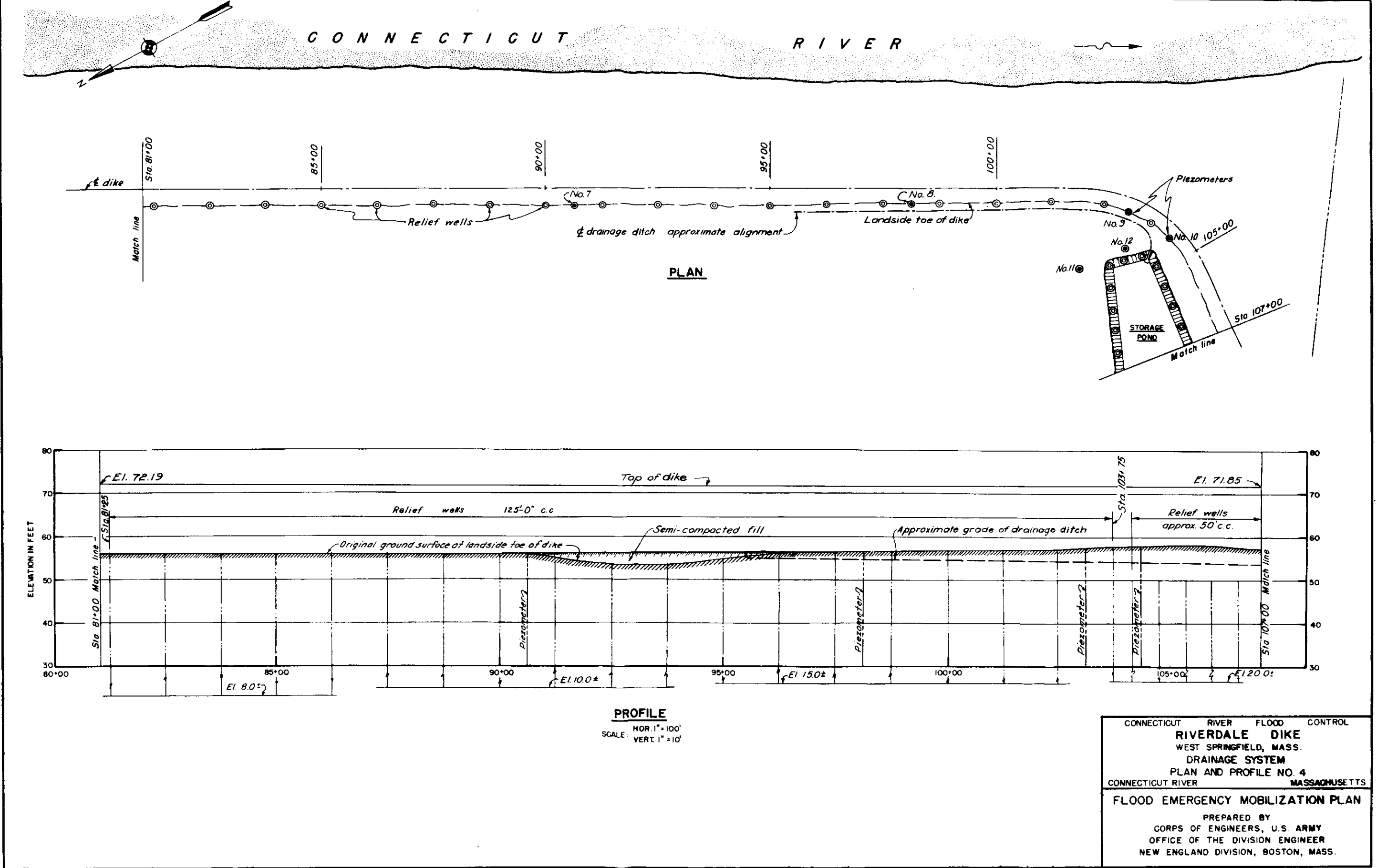


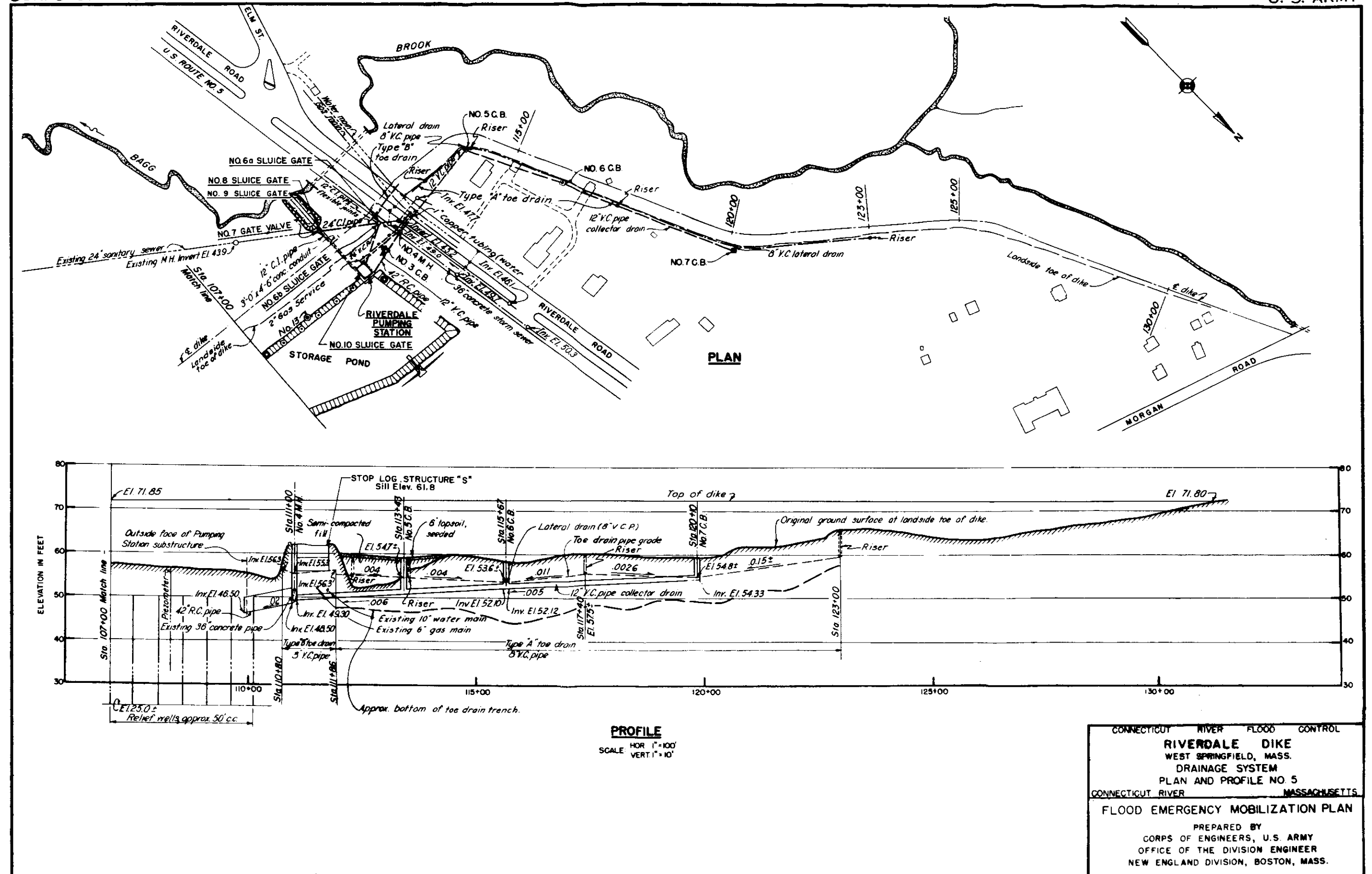
PROFILE

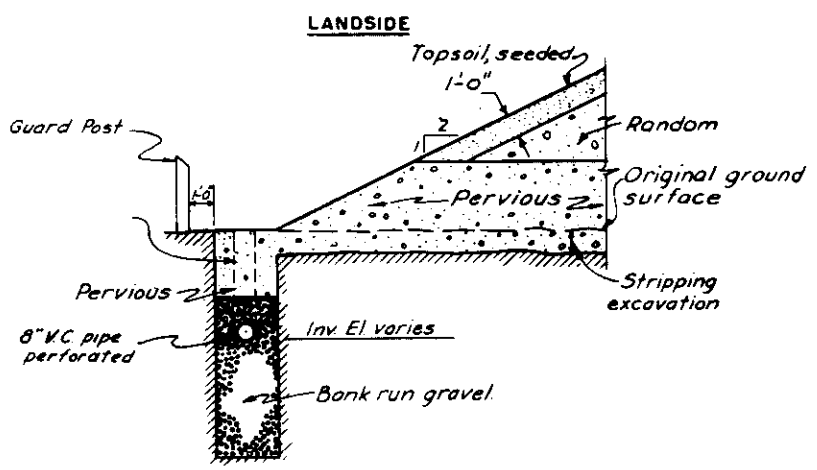
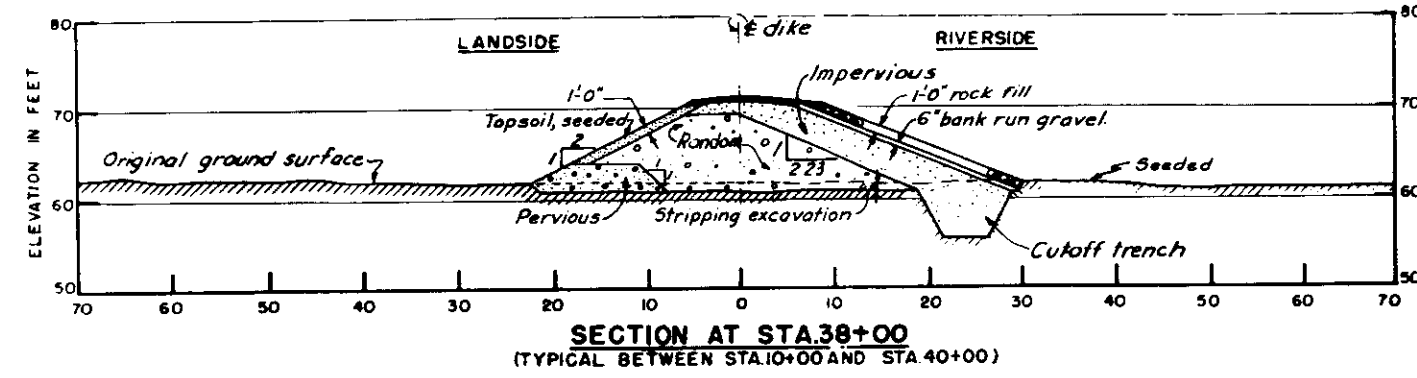
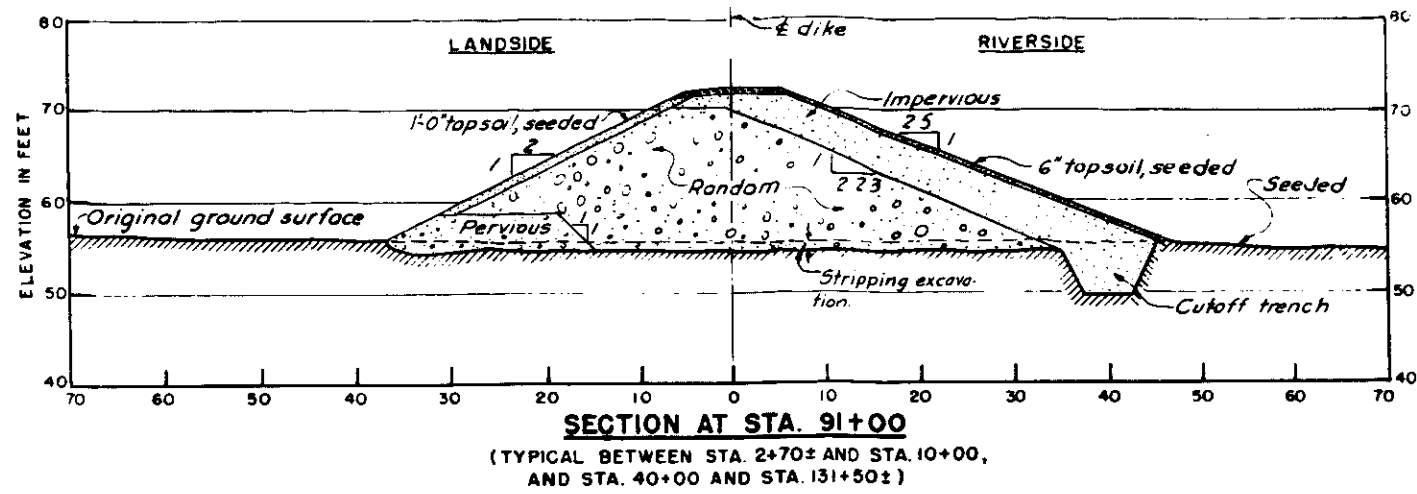
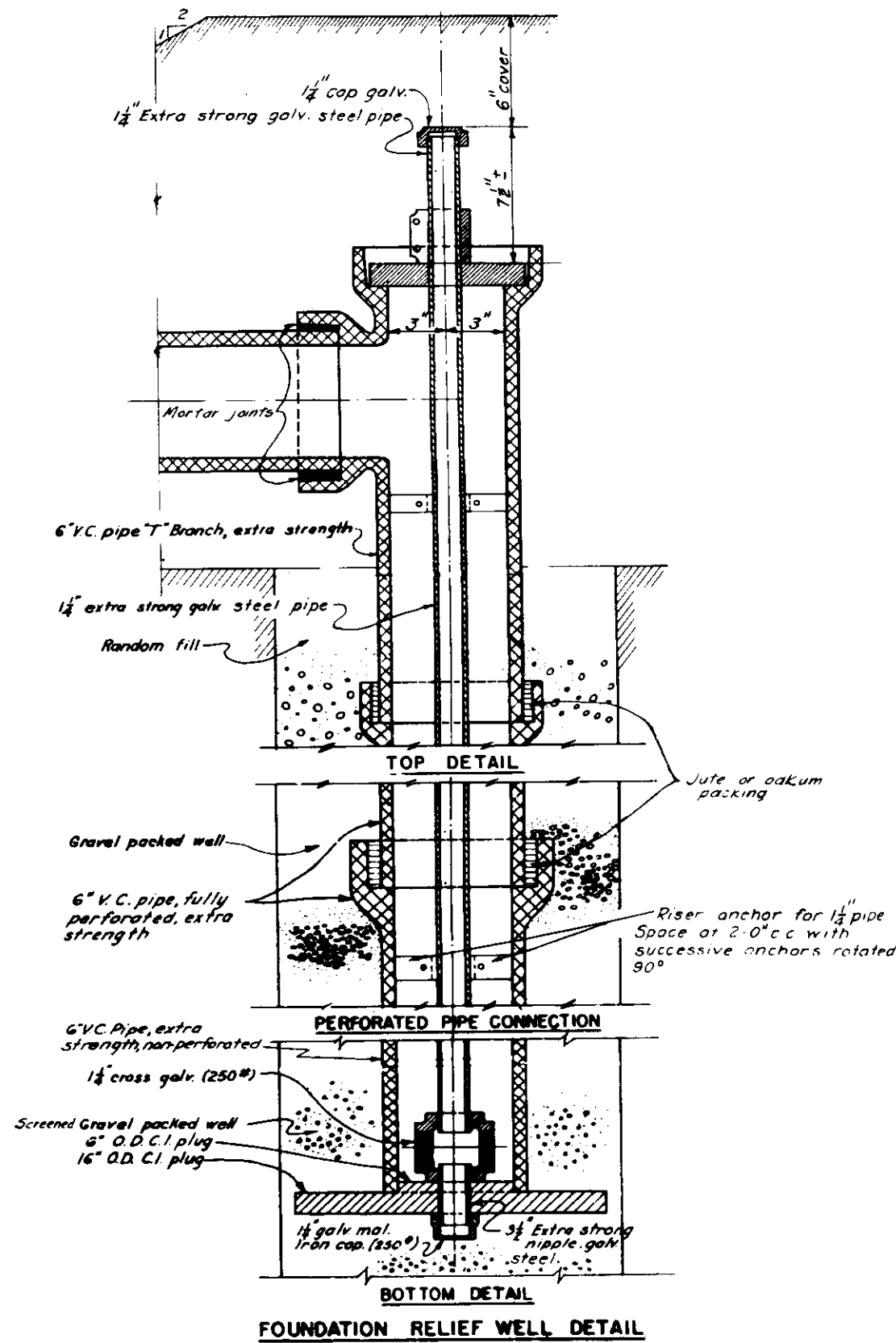
PROFILE

SCALE: HOR. 1" = 100'
VERT. 1" = 10'

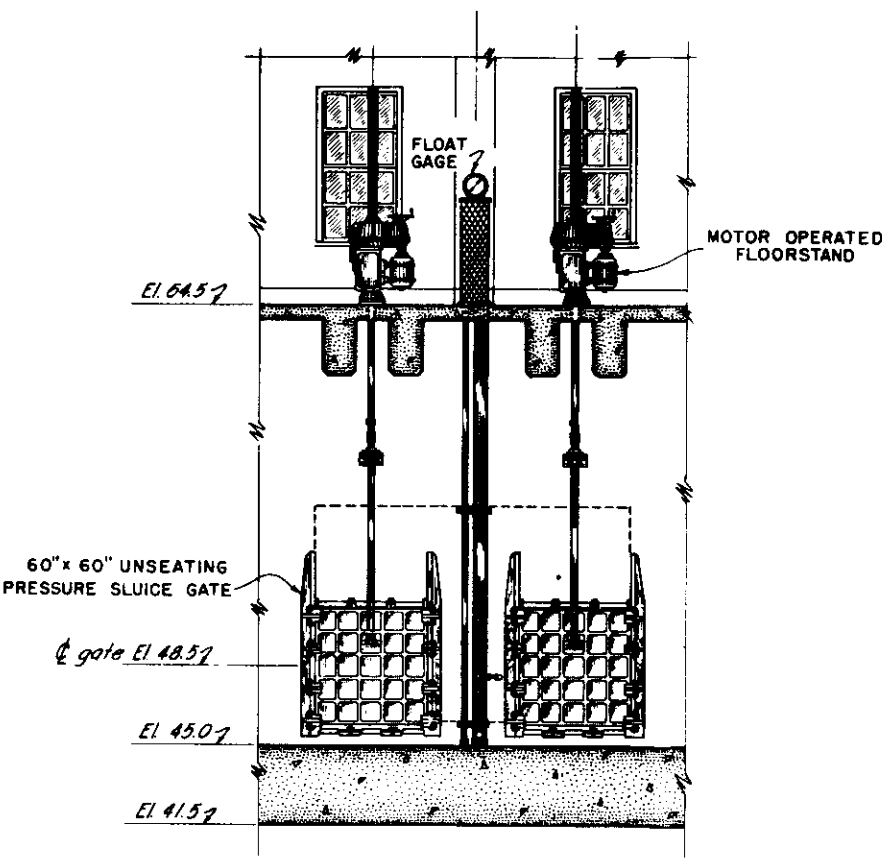
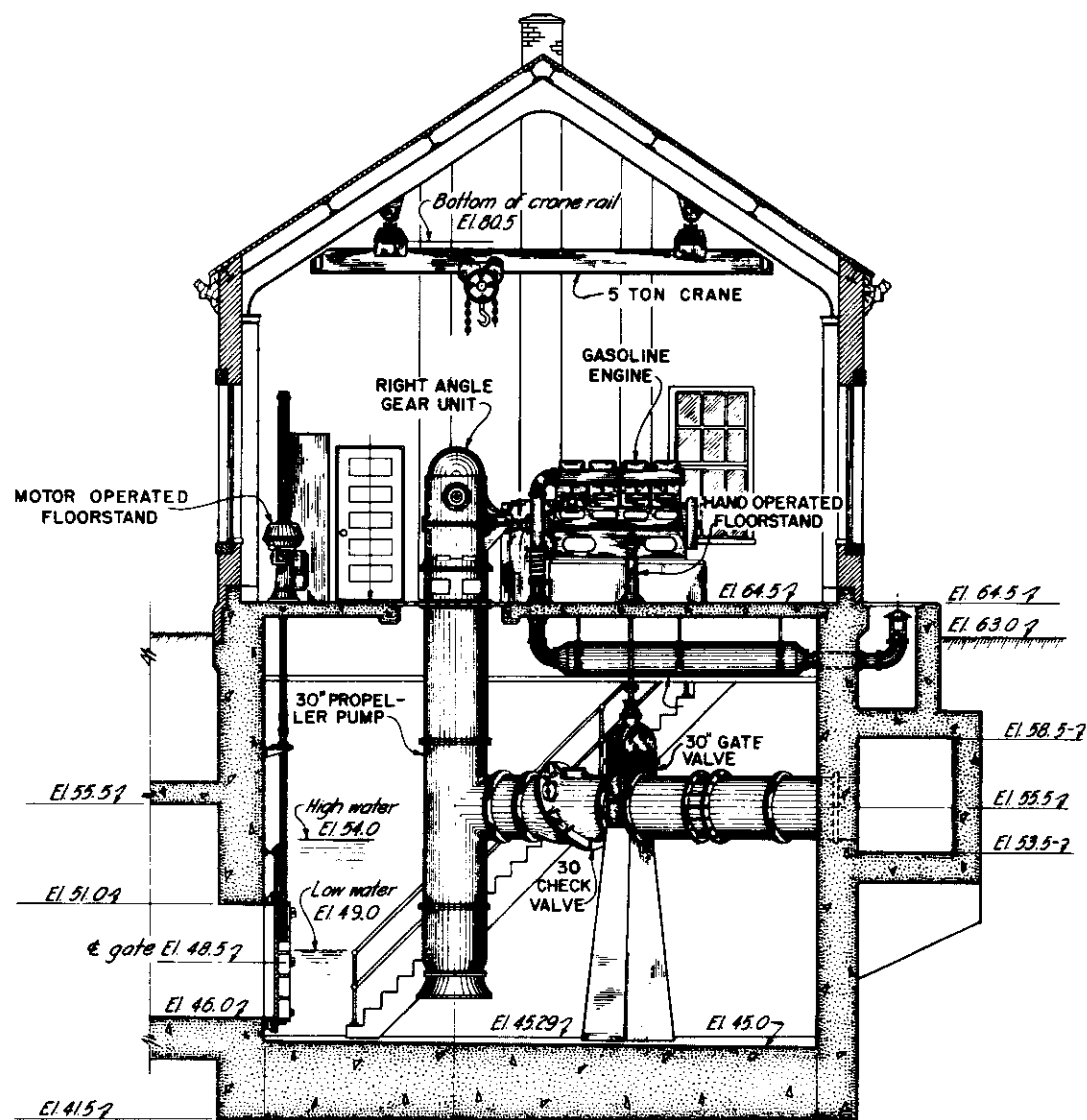
CONNECTICUT RIVER FLOOD CONTROL
RIVERDALE DIKE
WEST SPRINGFIELD, MASS.
DRAINAGE SYSTEM
PLAN AND PROFILE NO. 3
CONNECTICUT RIVER MASSACHUSETTS
FLOOD EMERGENCY MOBILIZATION PLAN
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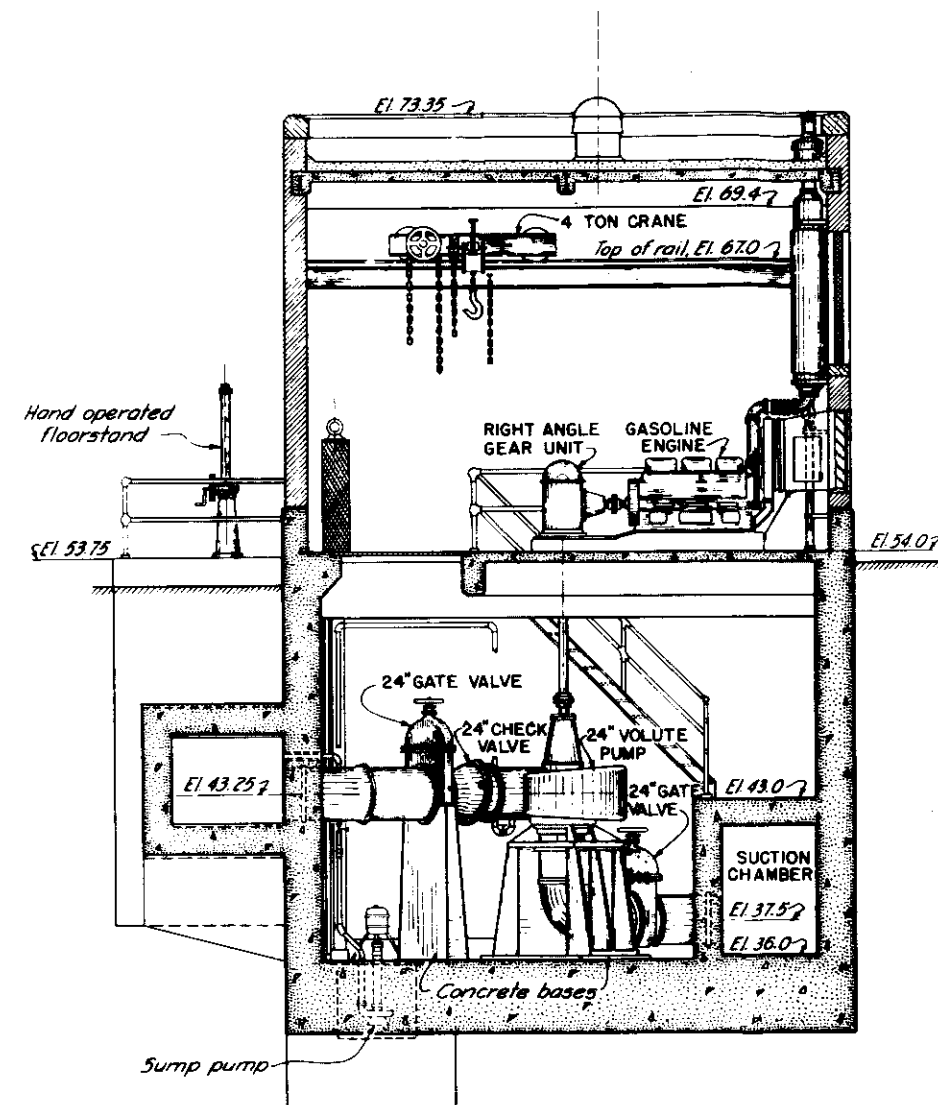


CONNECTICUT RIVER FLOOD CONTROL
RIVERDALE DIKE
WEST SPRINGFIELD, MASS.
EMBANKMENT AND RELIEF WELL DETAILS
CONNECTICUT RIVER MASSACHUSETTS
FLOOD EMERGENCY MOBILIZATION PLAN
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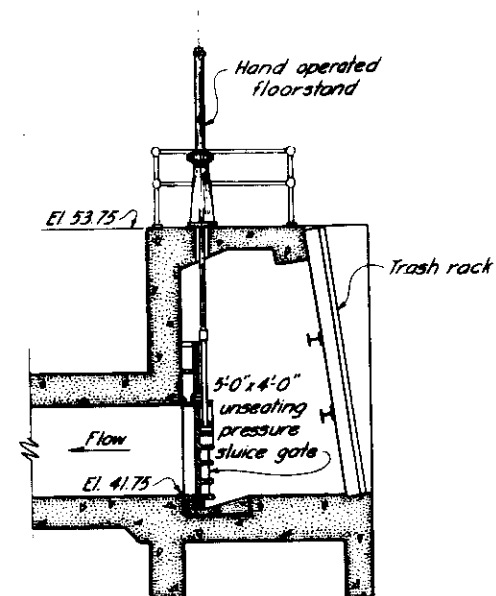


WARREN STREET STATION

CONNECTICUT RIVER FLOOD CONTROL
WEST SPRINGFIELD
PUMPING STATION EQUIPMENT
CONNECTICUT RIVER MASSACHUSETTS
FLOOD EMERGENCY MOBILIZATION PLAN
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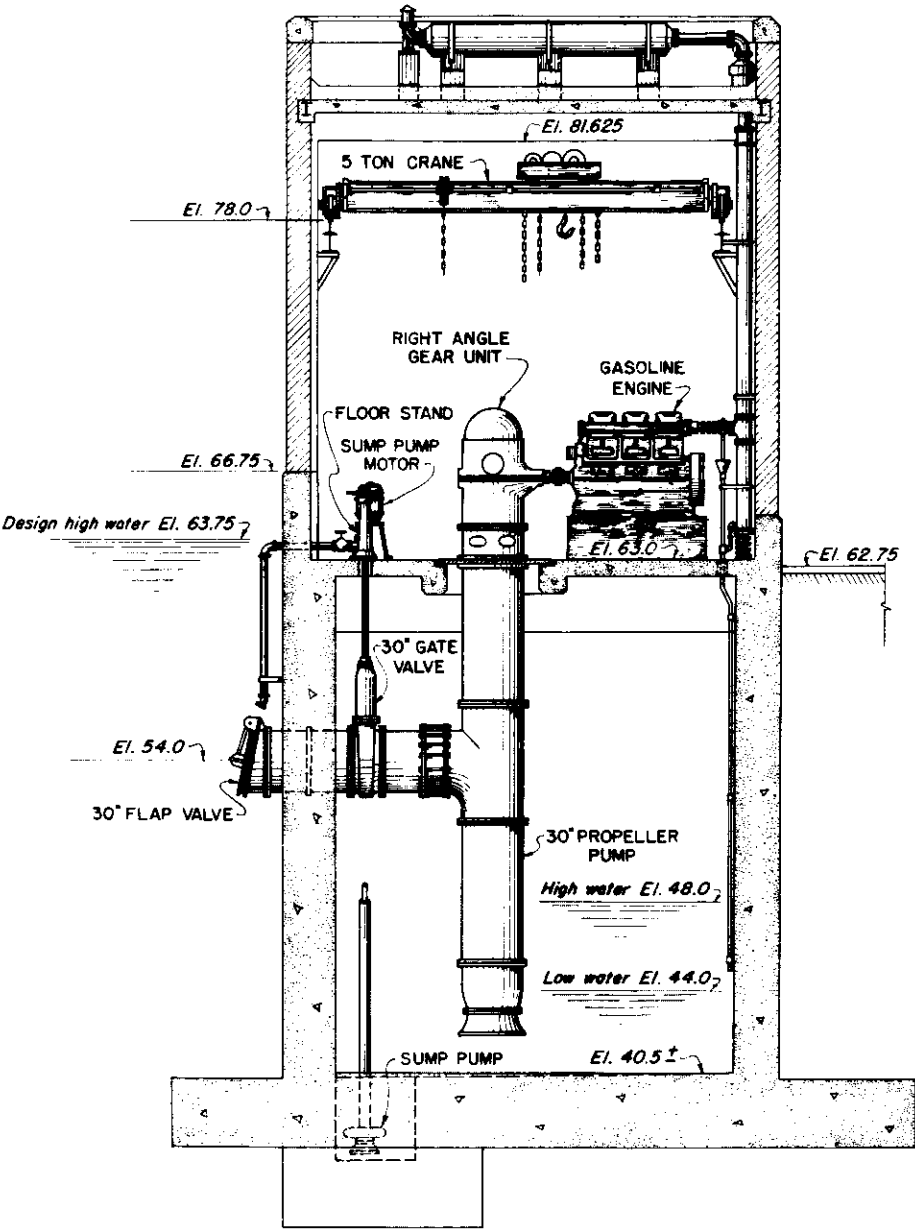


CIRCUIT AVENUE STATION

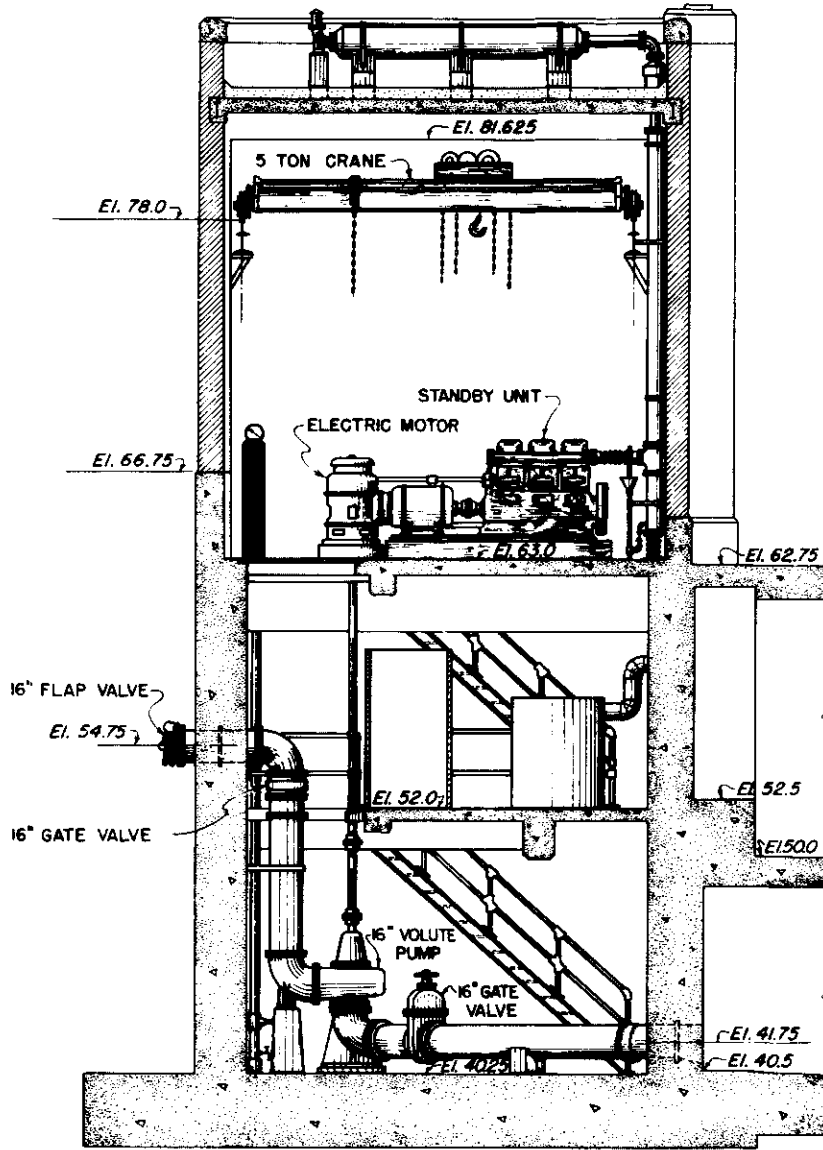


SECTION

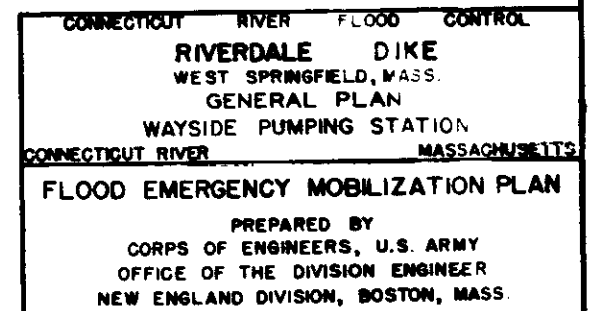
CONNECTICUT RIVER FLOOD CONTROL	
WEST SPRINGFIELD	
PUMPING STATION EQUIPMENT	
CONNECTICUT RIVER,	MASSACHUSETTS
FLOOD EMERGENCY MOBILIZATION PLAN	
PREPARED BY	
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OFFICE OF THE DIVISION ENGINEER	
NEW ENGLAND DIVISION, BOSTON, MASS.	

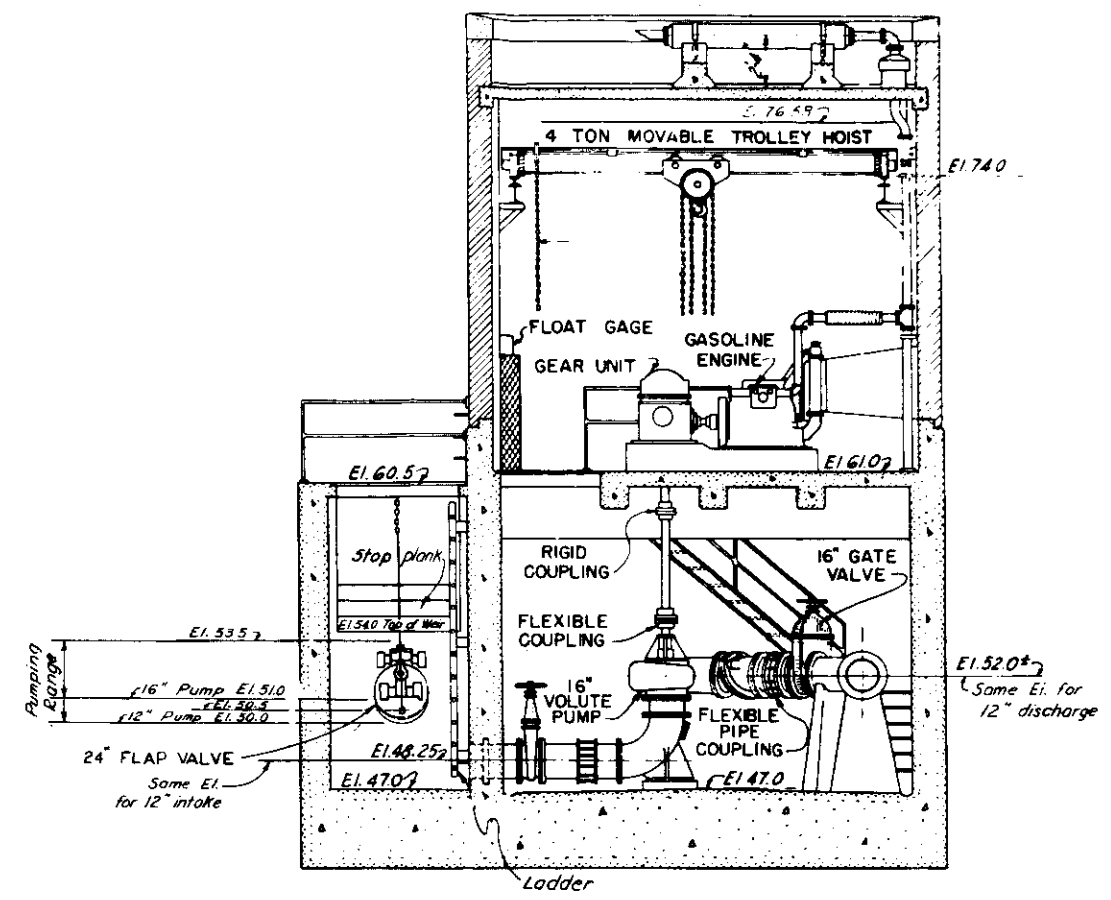
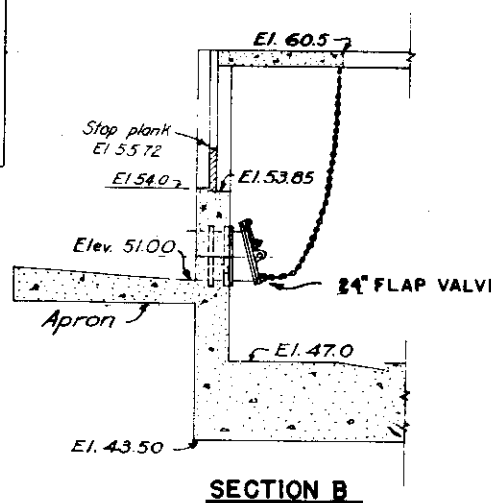
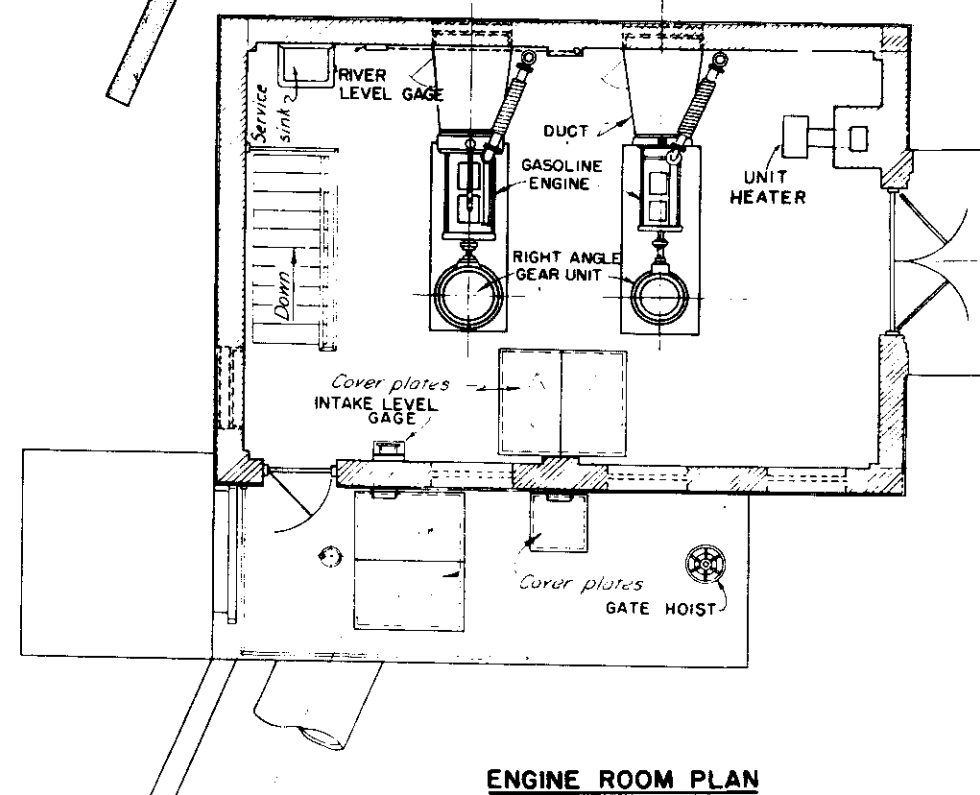
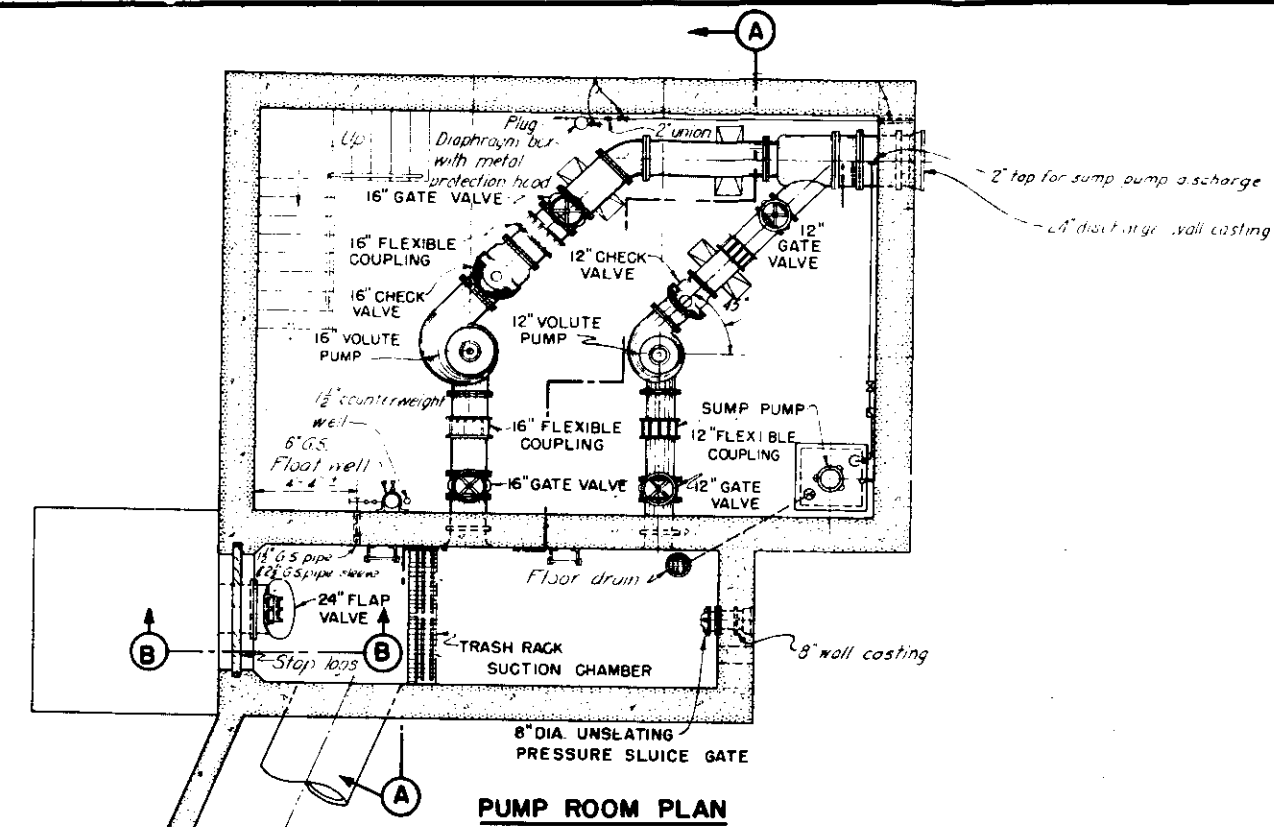


BRIDGE STREET STATION



CONNECTICUT RIVER FLOOD CONTROL
WEST SPRINGFIELD
PUMPING STATION EQUIPMENT
CONNECTICUT RIVER MASSACHUSETTS
FLOOD EMERGENCY MOBILIZATION PLAN
PREPARED BY
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NEW ENGLAND DIVISION, BOSTON, MASS.



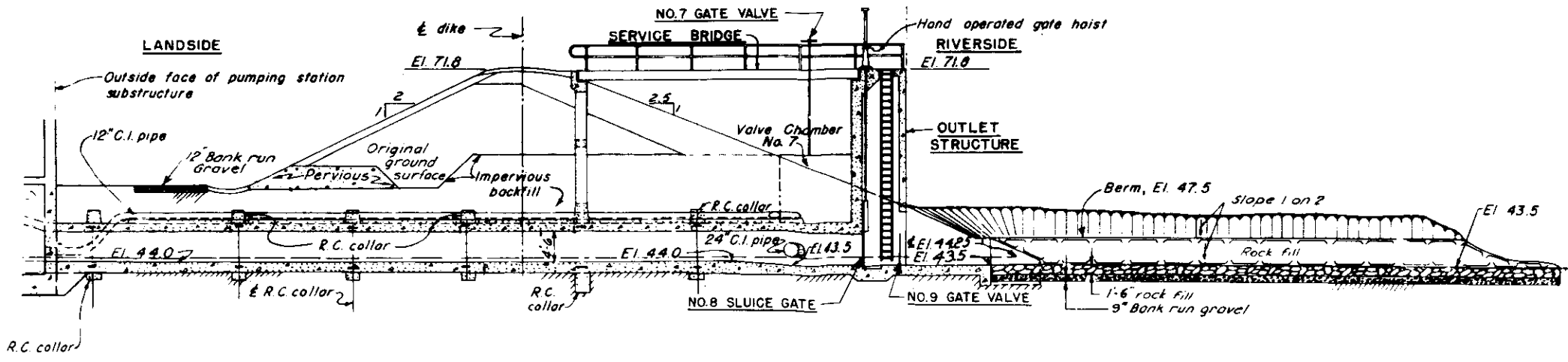
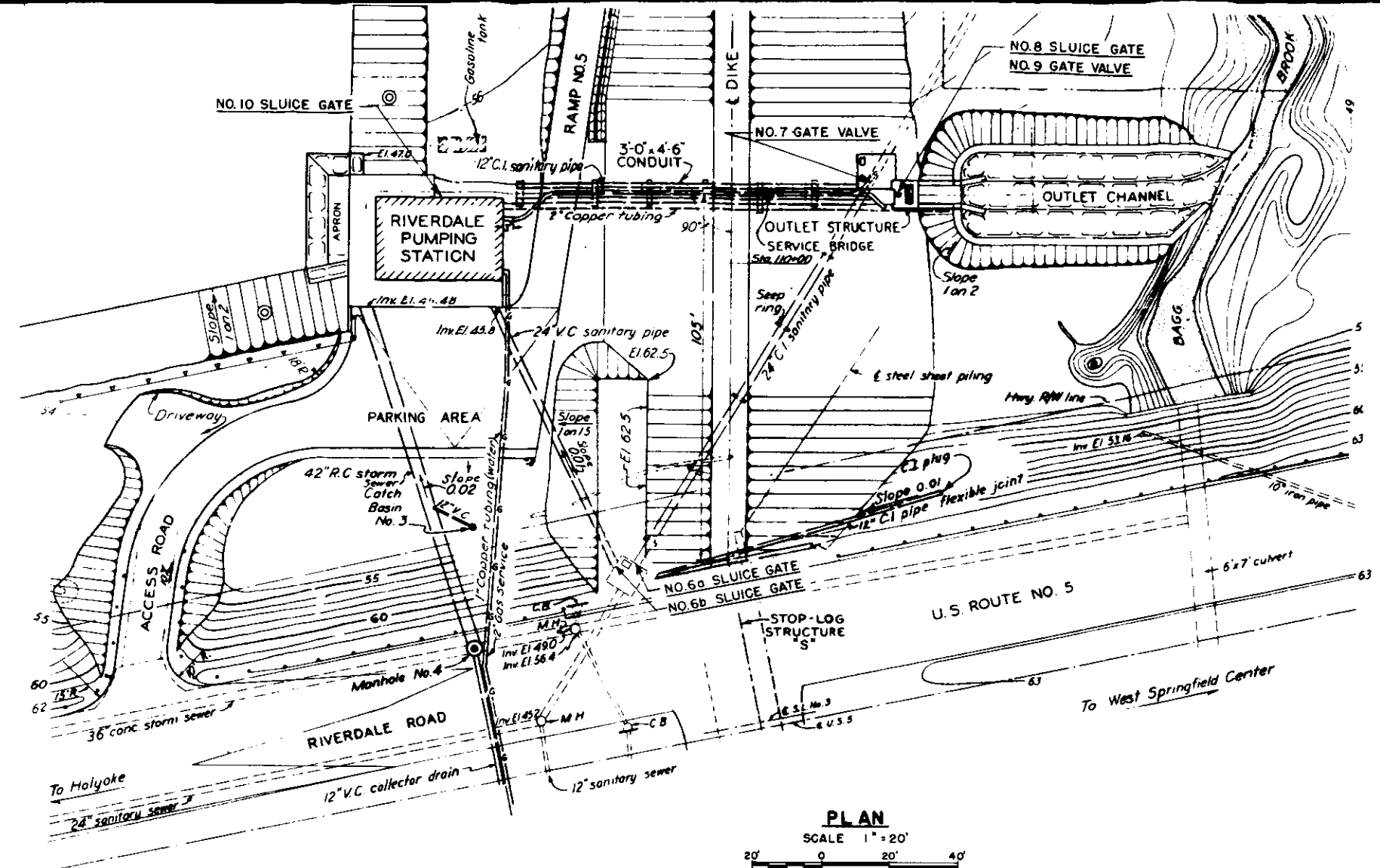


NOTE:
Stop planks to be left in place on weir at all times

SCALE 1/4" = 1'-0"

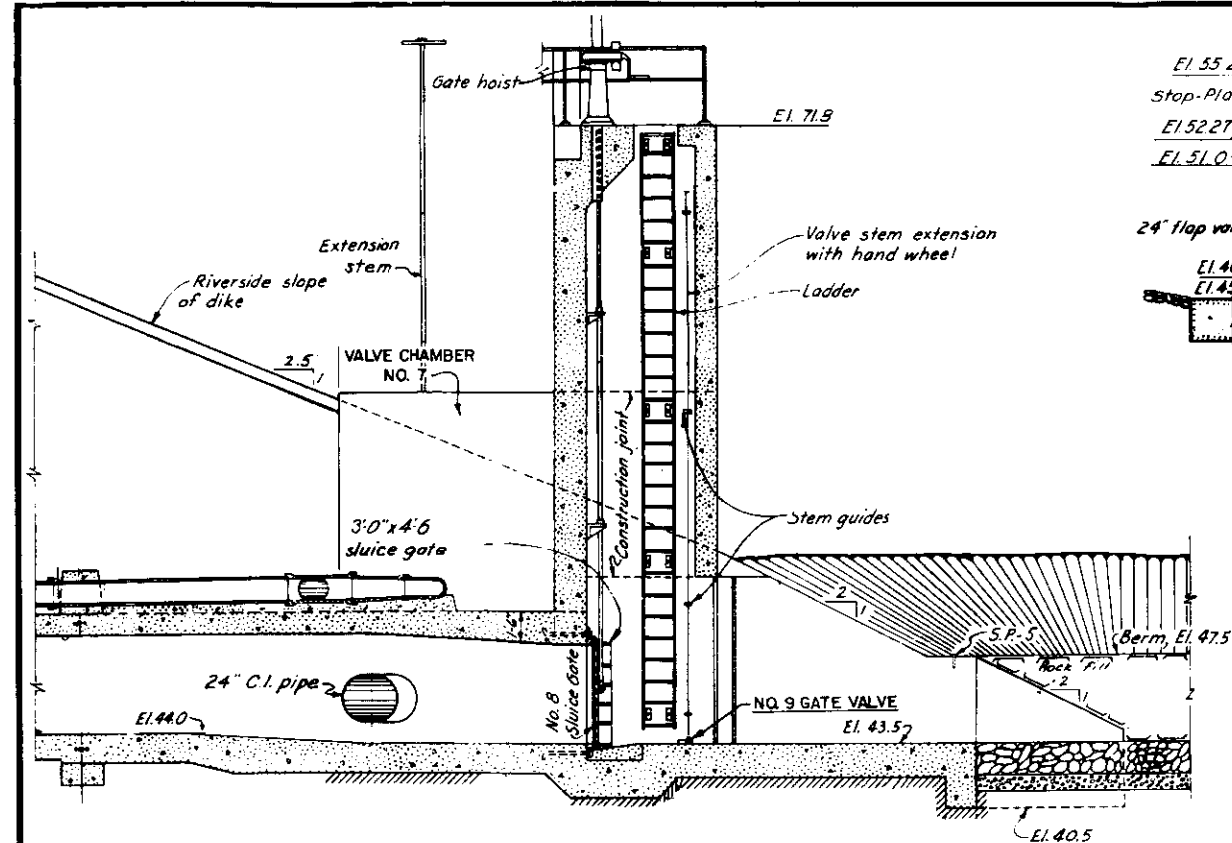
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CONNECTICUT RIVER FLOOD CONTROL
WAYSIDE PUMPING STATION
WEST SPRINGFIELD, MASS
GENERAL ARRANGEMENT OF EQUIPMENT
CONNECTICUT RIVER MASSACHUSETTS
FLOOD EMERGENCY MOBILIZATION PLAN
PREPARED BY
CORPS OF ENGINEERS, U.S. ARMY
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NEW ENGLAND DIVISION, BOSTON, MASS.

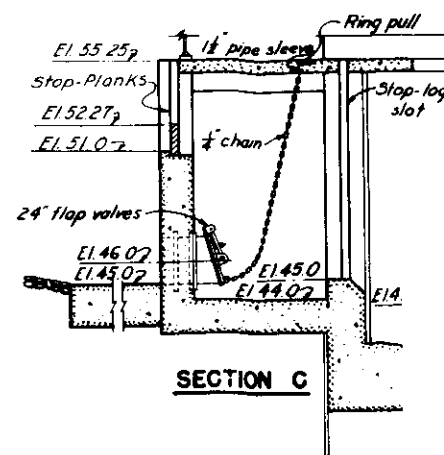


SECTION ON CONDUIT AND OUTLET CHANNEL

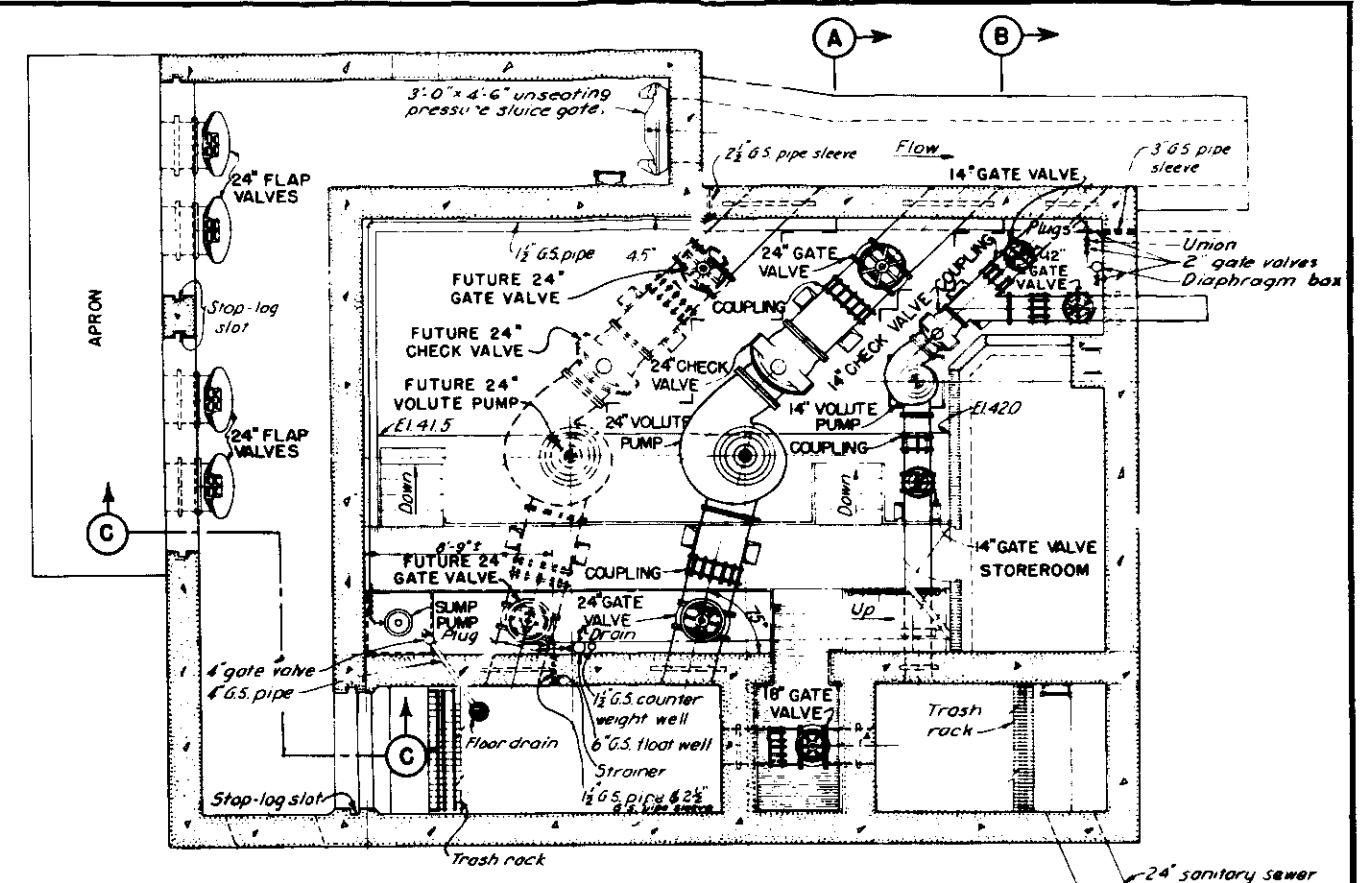
CONNECTICUT RIVER FLOOD CONTROL
RIVERDALE DIKE
WEST SPRINGFIELD, MASS.
GENERAL PLAN
RIVERDALE PUMPING STATION
CONNECTICUT RIVER MASSACHUSETTS
FLOOD EMERGENCY MOBILIZATION PLAN
PREPARED BY
CORPS OF ENGINEERS, U.S. ARMY
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NEW ENGLAND DIVISION, BOSTON, MASS.



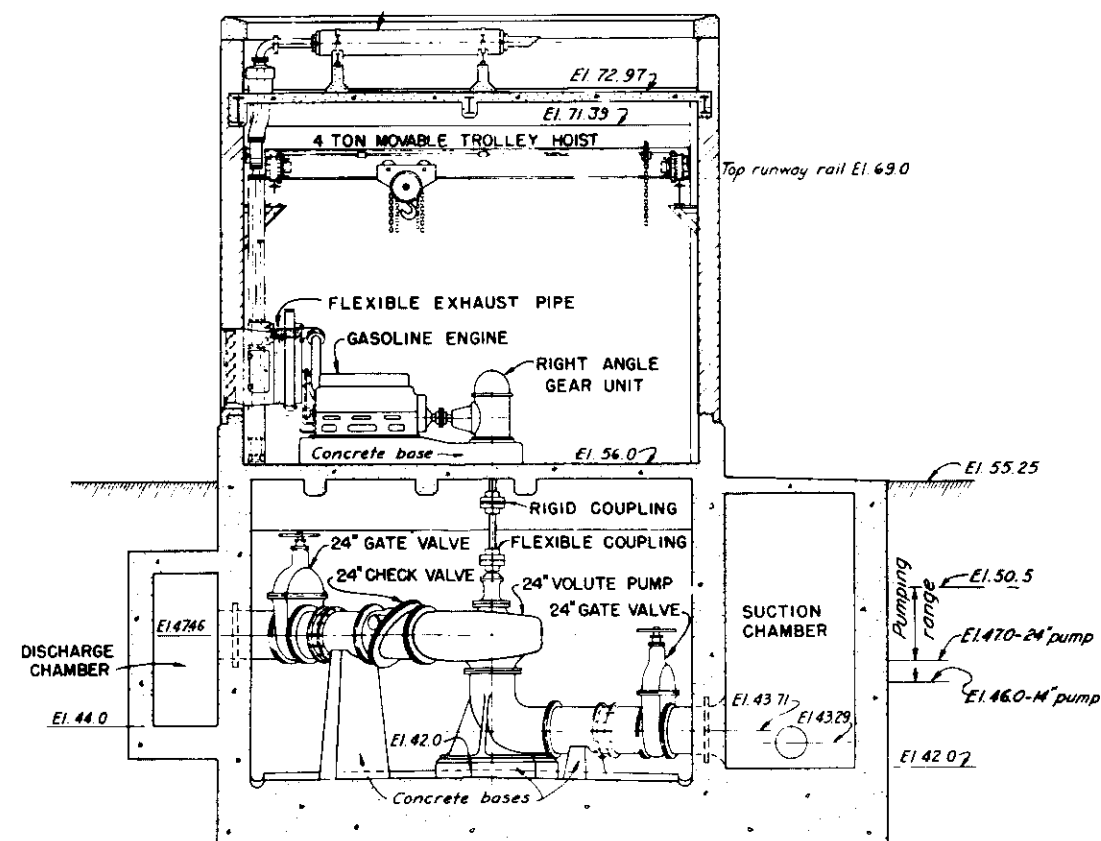
SECTION - OUTLET STRUCTURE



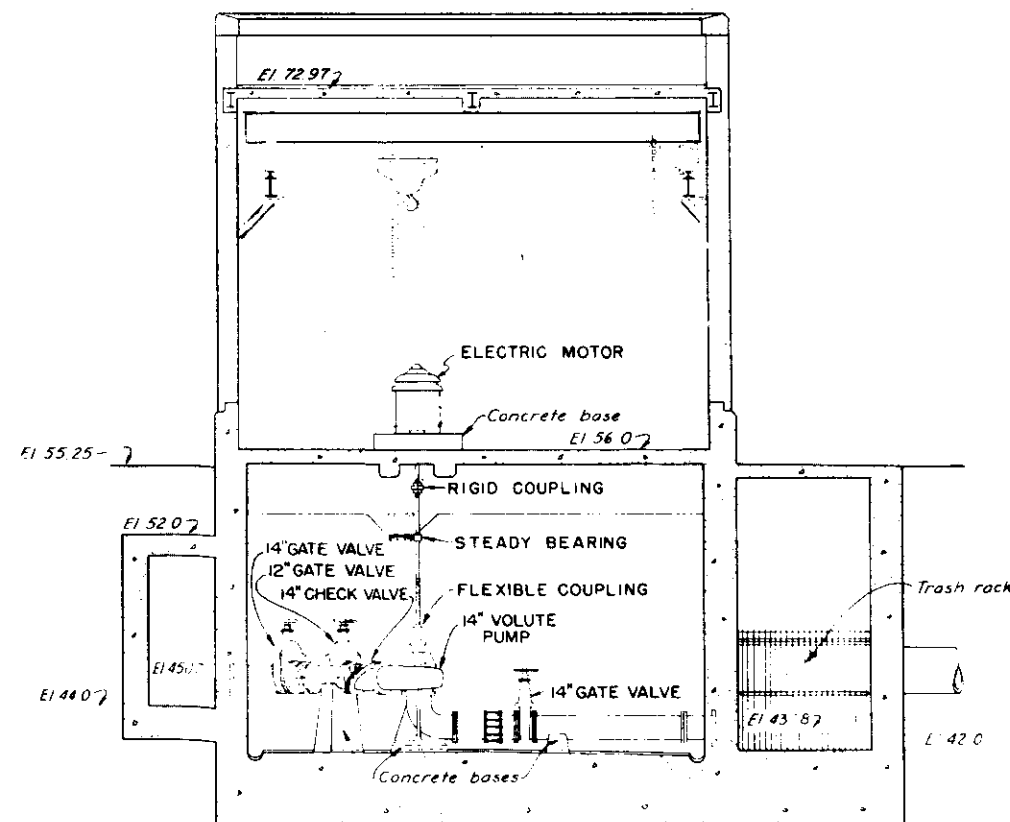
SECTION C



PUMP ROOM PLAN

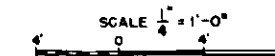


SECTION A

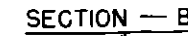
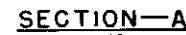
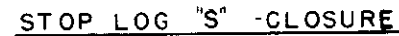
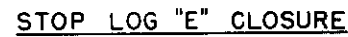


SECTION B

NOTE:-
Stop planks to be left in place on weir at all times.



CONNECTICUT RIVER FLOOD CONTROL
RIVERDALE PUMPING STATION
WEST SPRINGFIELD, MASS.
GENERAL ARRANGEMENT OF EQUIPMENT
CONNECTICUT RIVER MASSACHUSETTS
FLOOD EMERGENCY MOBILIZATION PLAN
PREPARED BY
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NEW ENGLAND DIVISION, BOSTON, MASS.



CONNECTICUT RIVER FLOOD CONTROL
RIVERDALE DIKE
WEST SPRINGFIELD, MASS.
STOP-LOG STRUCTURES
CLOSURE DETAILS
CONNECTICUT RIVER MASSACHUSETTS
FLOOD EMERGENCY MOBILIZATION PLAN
PREPARED BY
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OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION, BOSTON, MASS.

CHICOPEE, MASSACHUSETTS

The Chicopee flood protection system extends along the east bank of the Connecticut River from Leslie Street in Willimansett to the confluence of the Chicopee River, and up the Chicopee River approximately one mile to high ground. The system is composed of the following:

- 6,000 linear feet of concrete flood wall
- 22,200 linear feet of earth dike
- 6 pumping stations
- 5 tailrace gates on raceway outlets
- 3 stop-log structures
- 12 gated drainage structures

The above includes the section of wall in Chicopee from the Chicopee-Springfield town line north to high ground which protects portions of both cities. Operation and maintenance of this section is primarily the responsibility of the City of Chicopee but during flood periods, the cities of Springfield and Chicopee should coordinate their activities. In this area special attention should be given to closure of gate valves at Manhole No. 2 and at catch basin near Rendering Company plant; also closure of 18" gate valve in manhole near the Byrolly Trucking Company.

Dike profiles and typical sections, also pumping station details are shown on the plans on succeeding pages.

The method and sequence of operations in prosecuting a flood fight are set forth in the Operations and Maintenance Manual for Flood Protection System, Chicopee, Massachusetts, issued by this office and sent to the City. The Schedule of Operations is shown in detail on the attached Operations Chart, which refers to the gage at the east end of the Chicopee-West Springfield Bridge and is calibrated in feet above M.S.L.

The following record of high water elevations is furnished to provide an approximate relationship between the river stages at Holyoke Dam and at Charbonneau Terrace, Chicopee, which is approximately one mile below the dam. Predictions of river stages ordinarily are received from the U. S. Weather Bureau and Holyoke Water Power Company in terms of stage over Holyoke Dam and the table will provide an approximate conversion. However, too great reliance should not be placed on previous relations between these two stages as the Holyoke Tailwater elevation is affected by the discharge of rivers below Holyoke. The elevation of the top of the Holyoke Dam is 97.47 M.S.L.

Proposed protective works from Charbonneau Terrace northwards have not yet been constructed. This area is comparatively high and serious damage will occur only at stages higher than the 1938 flood.

February 1951

FLOOD FREQUENCIES DURING MARCH - JUNE
based on records from 1843-1938, incl.

Frequency	Elev. M.S.L.
Annual	52.0
2 Years	55.5
5 Years	57.0
10 Years	58.7
20 Years	60.5
50 Years	63.0

***At the Chicopee Highway Bridge**

PREVIOUS HIGH WATER ELEVATIONS

Stage over Holyoke Dam	at Charbonneau Terrace	at Chicopee-West Springfield Bridge
Nov. 1927	14.75	65.8
Mar. 1936	16.8	72.3
Sep. 1938	14.9	69.8
Mar. 1948	11.4	61.2
Jan. 1949	11.6	61.9

ESTIMATED SANDEAG REQUIREMENTS

Stop-log structures	1,000
Sand boils and sloughs	5,000
Raising wall one (1) foot	9,000
Raising dike one (1) foot	65,000

TOTAL 80,000

Recommended stock level for storage - 6,000 to 8,000

On hand 10 January 1954 - 3,650

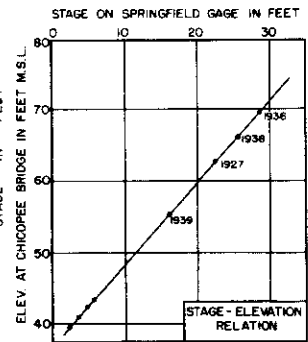
On order 10 January 1954 - 3,000

February 1954

CITY OF CHICOPEE

	<u>Exchange</u>
<u>Mayor:</u> Walter Trybulski	Chicopee 1542
City Hall	Chicopee 762-R
(Res.) 22 Carlton Ave., Chicopee Falls	
<u>Superintendent of Maintenance and Operation</u> <u>of Flood Protection System:</u> Thomas F. Robinson	
City Engineer	
City Hall	Chicopee 1542
(Res.) 363 Springfield St.	Chicopee 381
<u>Superintendent of Highways:</u> Thomas A. Laramee	
City Hall	Chicopee 1542
(Res.) 619 McKinstry St.	Holyoke 2-3037
<u>Pumping Station Operator:</u> Albert Dupuis	
(Res.) 42 Ferry St.	Holyoke 2-7057
<u>Jones Ferry Pumping Station:</u>	Chicopee 2979
<u>Red Cross Headquarters:</u> 99 Church St.	Chicopee 75
Chicopee Falls	

February 1952

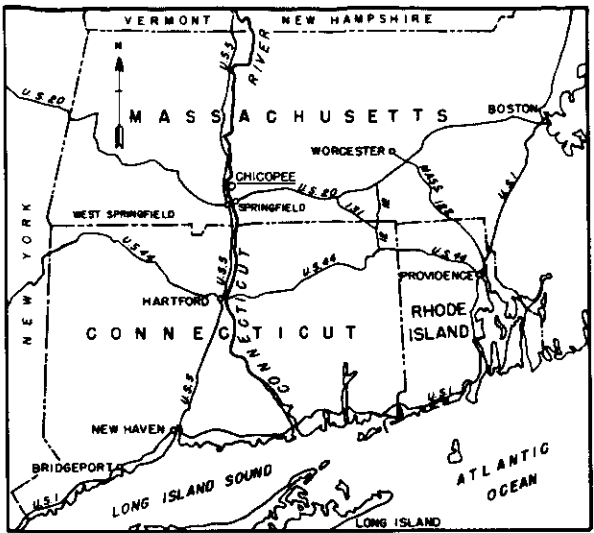


NOTE: SPRINGFIELD, MASS. CONNECTICUT RIVER GAGE IS A RECORDING GAGE LOCATED AT MEMORIAL BRIDGE. ZERO OF GAGE IS 37.3 MEAN SEA LEVEL.

CONNECTICUT RIVER GAGE
GAGE LOCATED AT EAST END OF CHICOPEE - WEST SPRINGFIELD BRIDGE. GAGE CALIBRATED IN FEET ABOVE MEAN SEA LEVEL.

68.0	
67.0	
66.0	Close stop log structure No. 3. (Plate No. XVII)
65.0	Close gate valves in No. 2 manhole and in catch basin at Springfield Rendering Co. (Plate No. XXXVIII) Close stop log structure No. 2. (Plate No. XXIII)
64.0	
63.0	Close stop log structure No. 1. (Plate No. XXIII)
62.0	
61.0	Clear flap valve on 10" pipe outlet Moore Drop Forge Co. (Plate No. XXXV)
60.0	
59.0	
58.0	Start operation of Plainfield Pumping Station No. 1 (Plate No. XLII)
57.0	
56.0	Start operation of Dwight Pumping Station No. 2 (Plate No. XXXIII)
55.0	Close 16" sluice gate in manhole at Moore Drop Forge Co. (Plate No. XXXV)
54.0	Close 12" gate valve in manhole No. 22 (Plate No. XXVII) Close 8" gate valve in manhole No. 21 (Plate No. XXVI) Close 16" sluice gate in manhole No. 20 (Plate No. XXVI) Clear flap valve on 18" pipe outlet Moore Drop Forge Co. (Plate No. XXXV)
53.0	Close 30" sluice gate in manhole No. 11 (Plate No. XXV) Close tailrace gate No. 2 (Plate No. XXIII) Close tailrace gate No. 1 (Plate No. XXIII)
52.0	
51.0	Close gate valve on 36" pipe intake at Gaspee St. (Plate No. XVII)
50.0	
49.0	Clear flap valve on manhole No. 22 outlet (Plate No. XXVII) Clear flap valve on 36" pipe outlet at Gaspee St. (Plate No. XVII)
48.0	Start operation of Bertha Ave. Pumping Station No. 3 (Plate No. XLIV)
47.0	Clear flap valve on manhole No. 21 outlet (Plate No. XXVI)
46.0	Start operation of Coll Street Pumping Station No. 5 (Plate No. LIV) Start operation of Jones Ferry Pumping Station No. 5 (Plate No. LI)
45.0	Clear flap valve at Plainfield Pumping Station No. 1 outlet (Plate No. XLII)
44.0	
43.0	Start operation of Poderewski Pumping Station No. 4 (Plate No. XLVII)
42.0	Clear flap valve on manhole No. 20 outlet (Plate No. XXVI) Clear flap valve on manhole No. 11 outlet (Plate No. XXV) Clear flap valves at Bertha Ave. Pumping Station No. 3 outlet (Plate No. XLIV)

SCHEDULE OF OPERATIONS



LOCATION MAP
SCALE OF MILES
0 10 20 30

NOTES

CLOSURE STRUCTURE

When the Connecticut River reaches elevation 62.0 on the gage located at the Chicopee - West Springfield Bridge, stop log timbers and other closure parts shall be delivered at the following locations and should be in position when the river reaches the elevations listed below:

- 64.9 Stop log No. 1
- 66.5 Stop log No. 2
- 67.5 Stop log No. 3

PARTIES TO BE NOTIFIED

When the Connecticut River reaches the elevations shown below on the gage, the parties listed opposite the elevations below shall be notified as indicated:

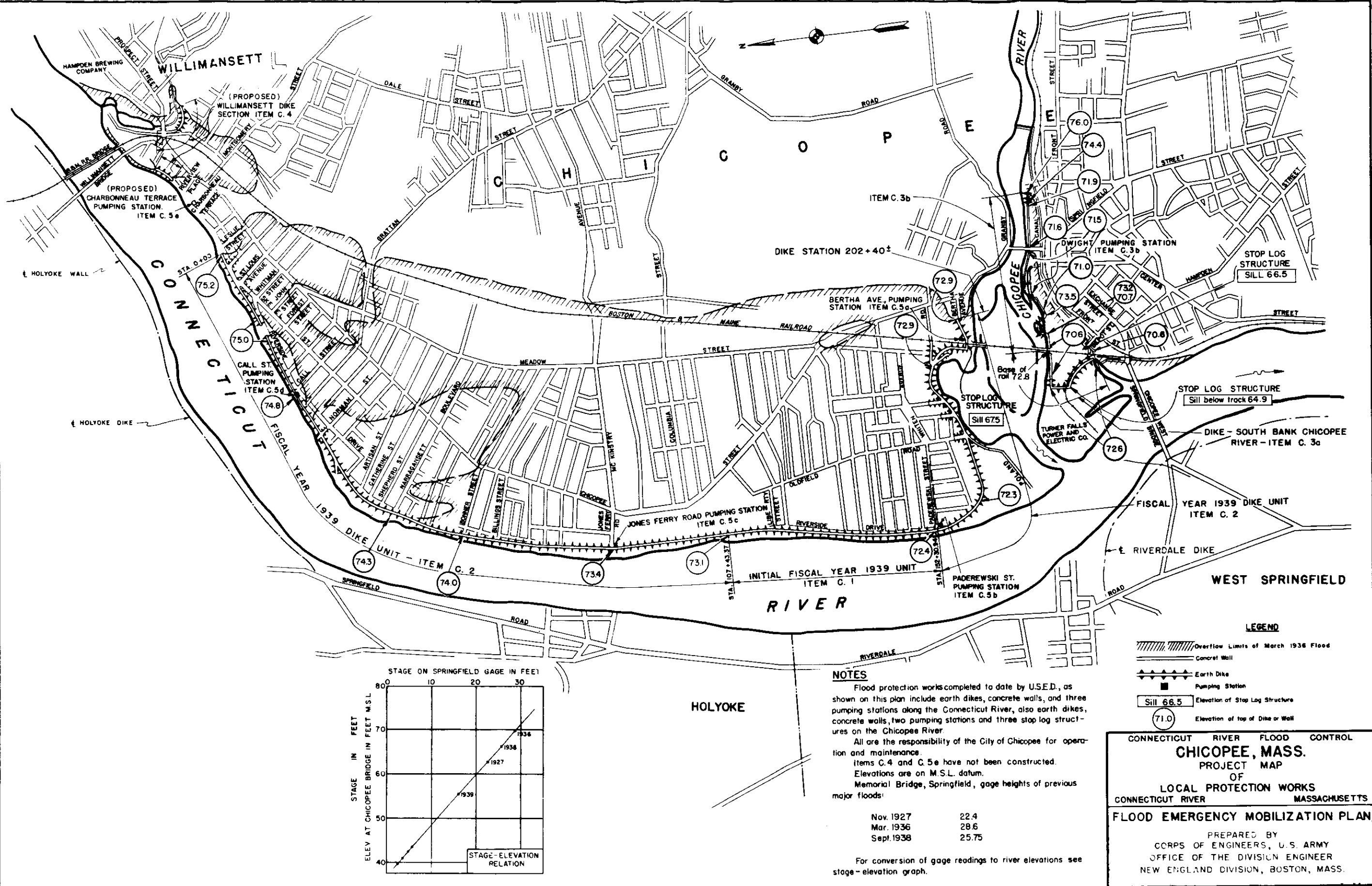
- 52.0 Notify A. G. Spalding Co. that gates on tailrace No. 1 and No. 2 are to be closed.
- 56.5 Notify Turners Falls P. & E. Co. that gates on tailrace No. 3 are to be closed.
- 63.5 Notify B. & M. R.R., Turners Falls P. & E. Co., and Moore Drop Forge Co. that stop log No. 1 is to be closed.
- 63.0 Notify Industrial Building Corporation, Turners Falls P. & E. Co., and Moore Drop Forge Co. that stop log No. 2 is to be closed.
- 66.0 Notify B. & M. R.R. Office at Greenfield, Mass. that stop log No. 3 is to be closed.

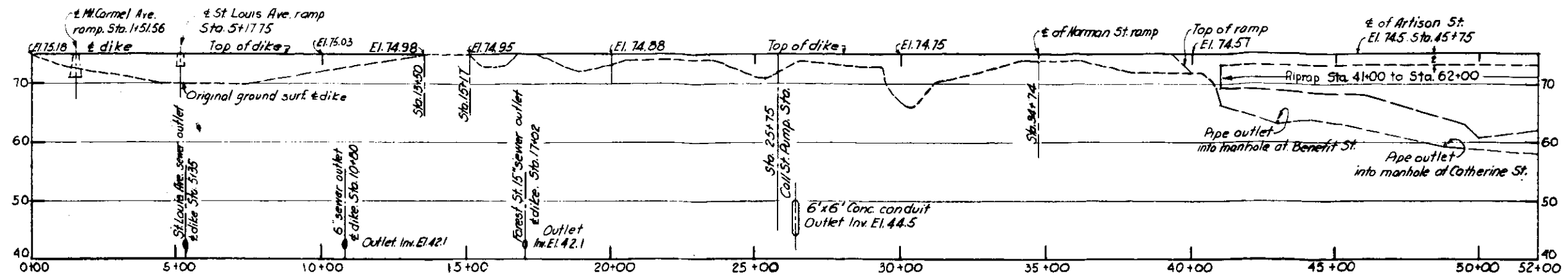
**CONNECTICUT RIVER FLOOD CONTROL
FLOOD PROTECTION SYSTEM
CHICOPEE, MASS.
OPERATIONS CHART**

SCALE: 1 IN. = 1000 FT.
NEW ENGLAND DIVISION, BOSTON, MASS.

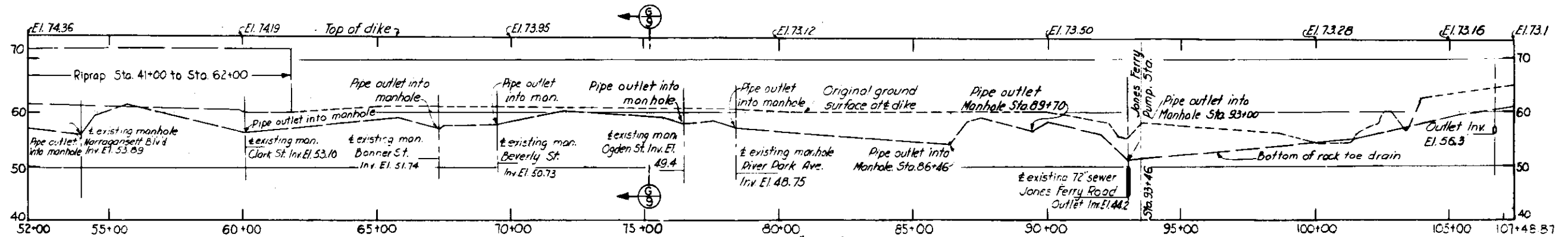
FLOOD EMERGENCY MOBILIZATION PLAN

FILE NO. CT-4-3455

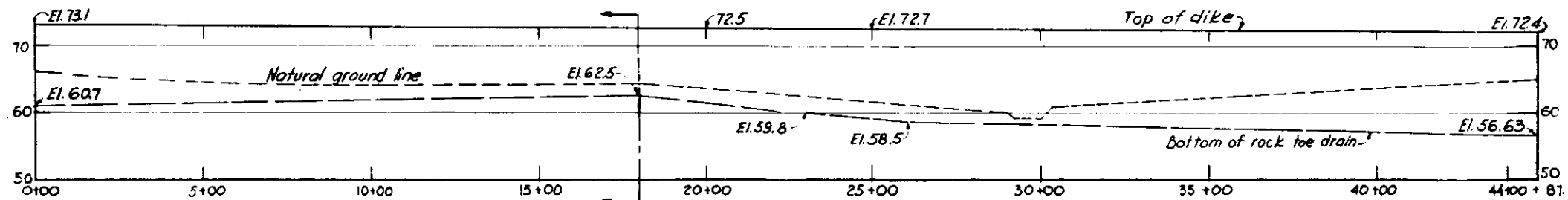




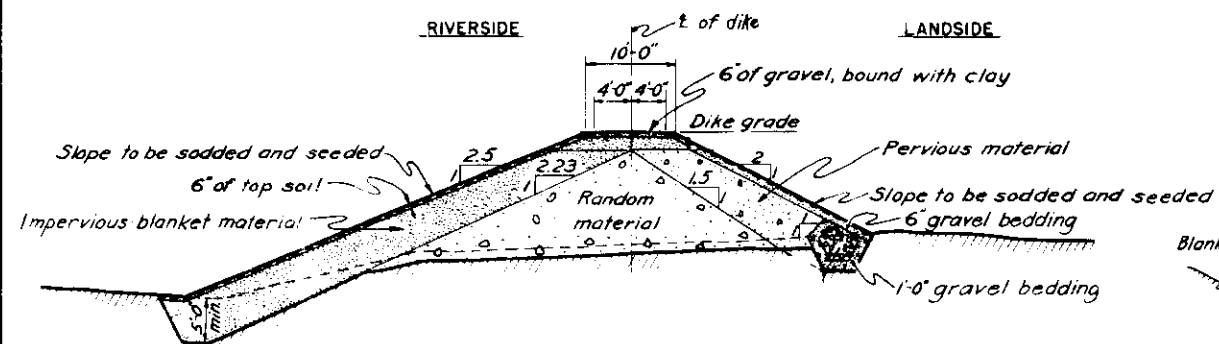
SCALE HOR. 1" = 400'
VER. 1" = 20'



SCALE: HOR. 1" = 400'
VER. 1" = 20'

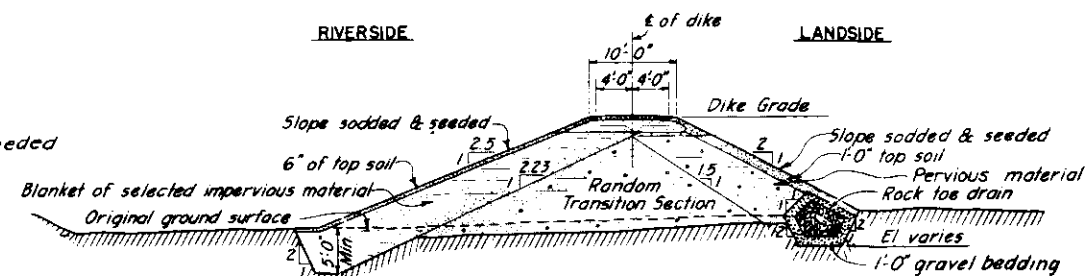


SCALE HOR. 1" = 400'
VER. 1" = 20'



SECTION $\frac{6}{9}$ AT STATION 75+10

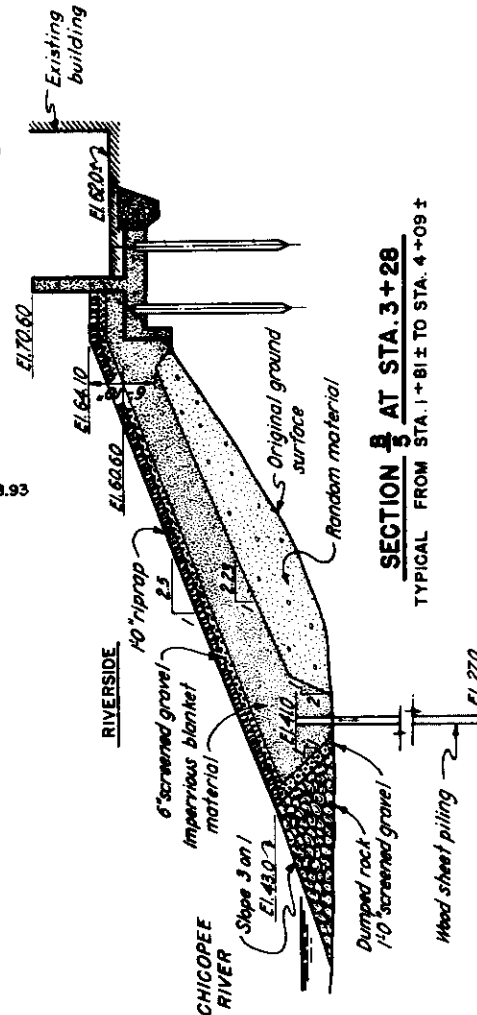
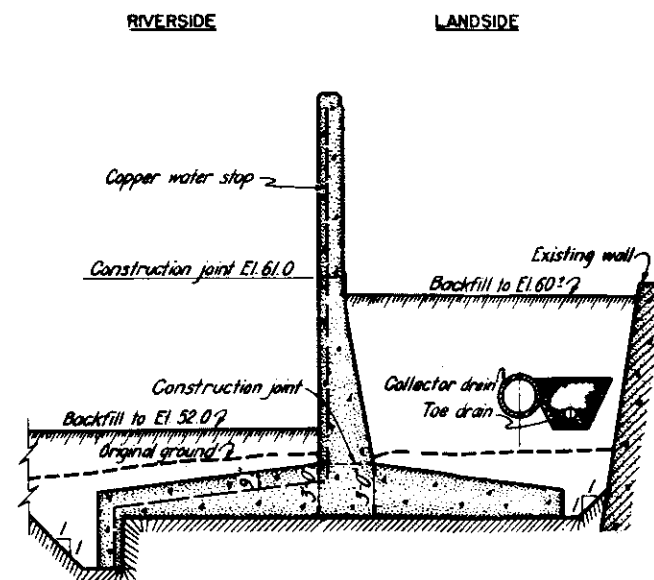
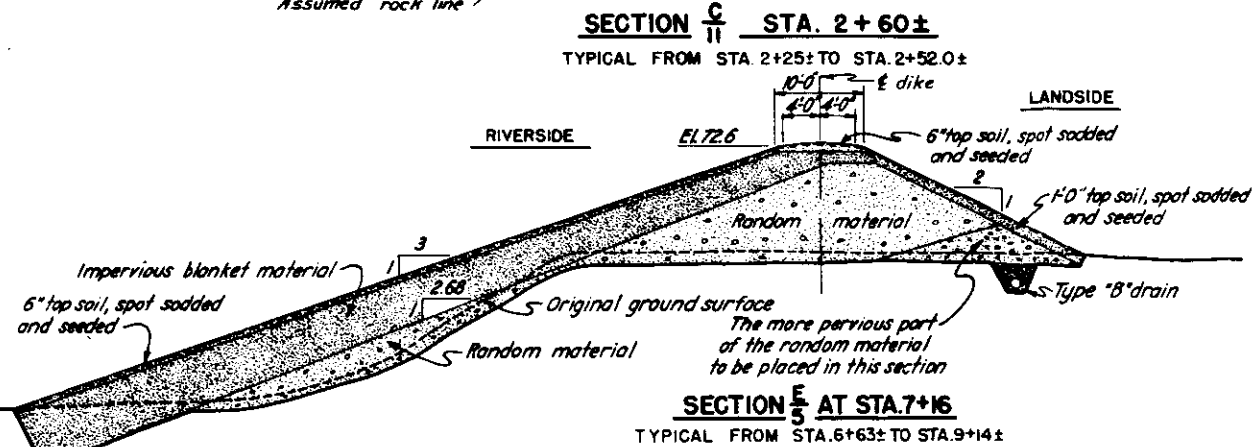
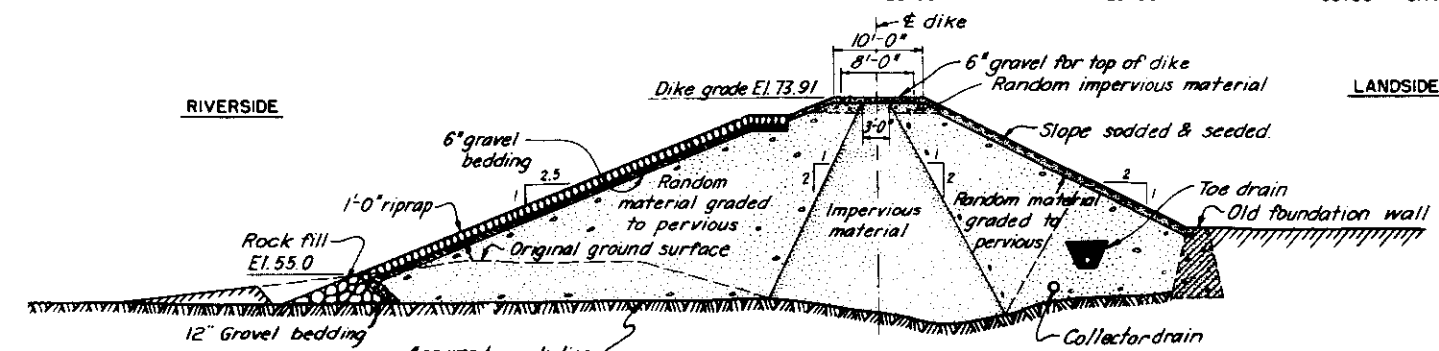
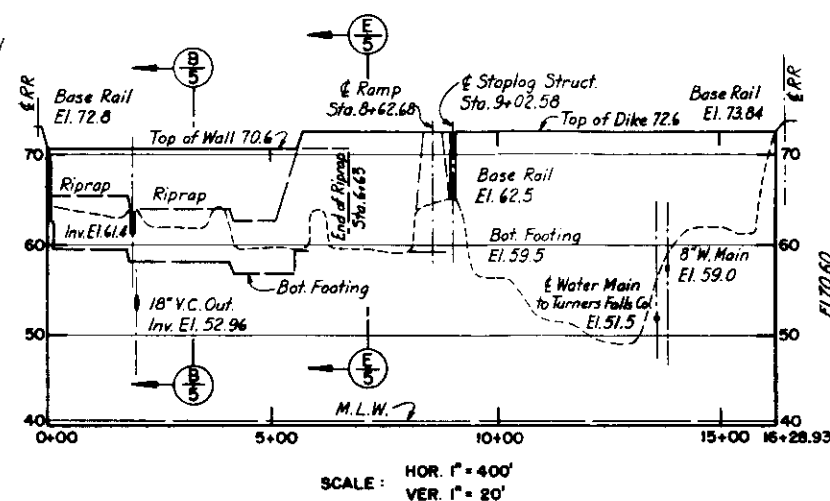
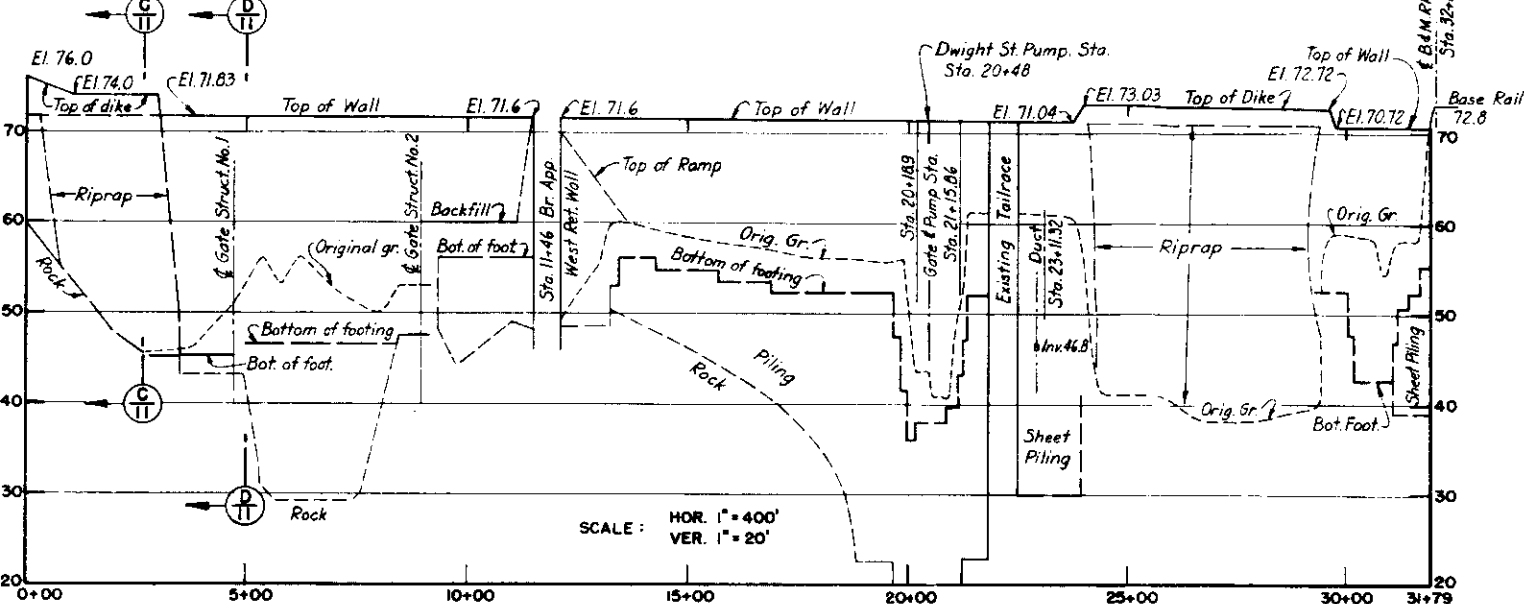
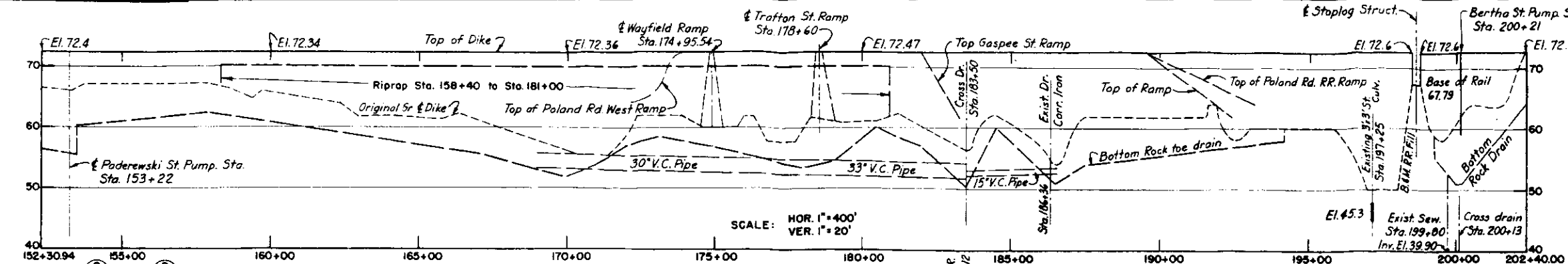
(TYPICAL FROM STA. 62+00± TO STA. 104+00± & FROM STA. 190+50± TO STA. 195+20±)



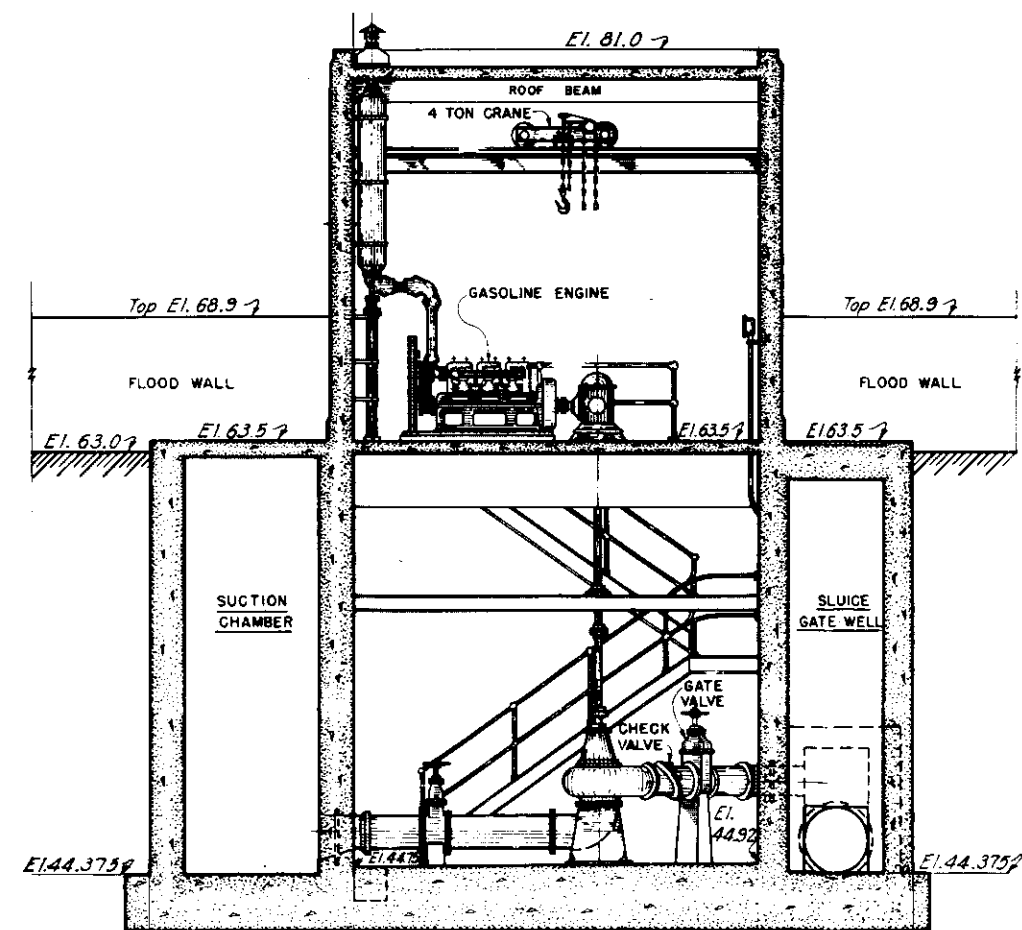
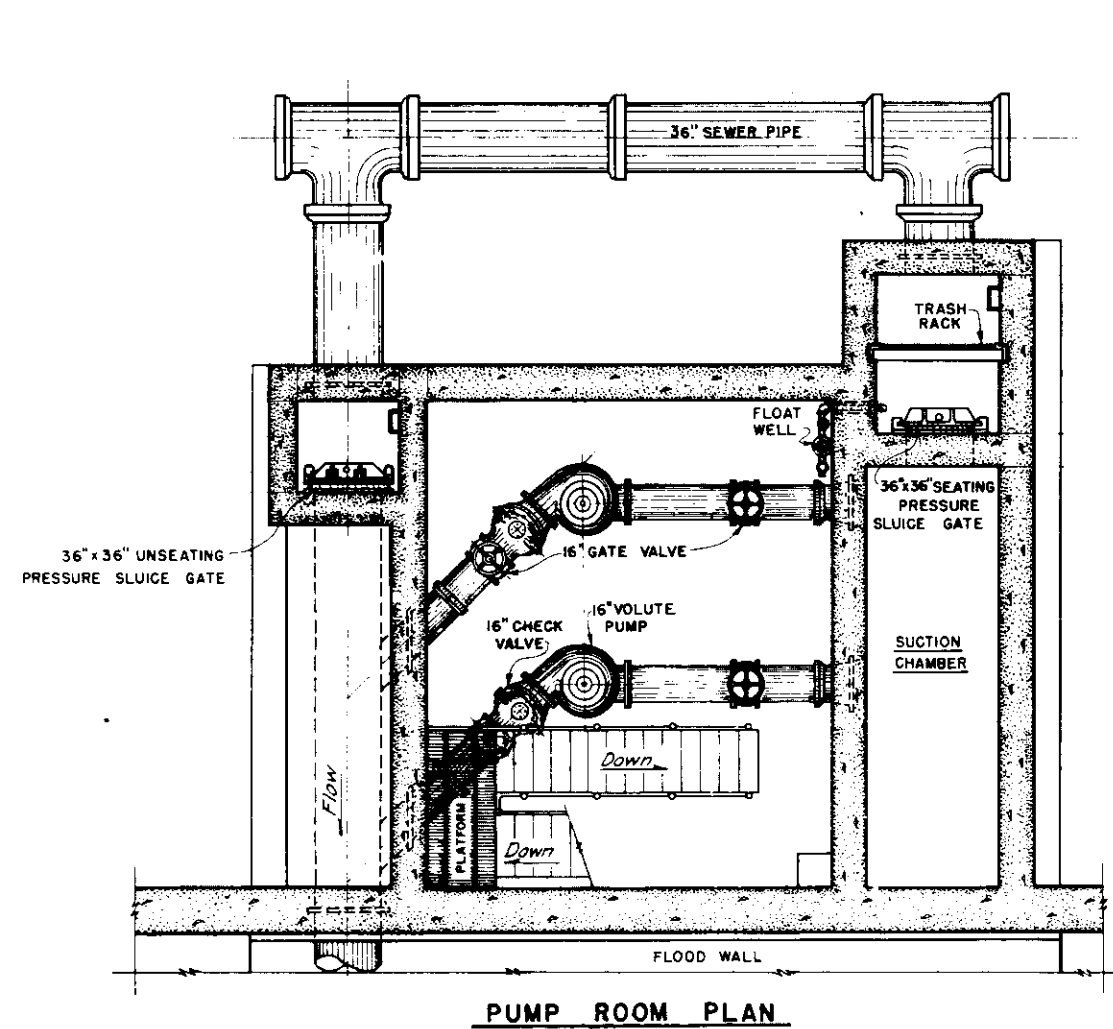
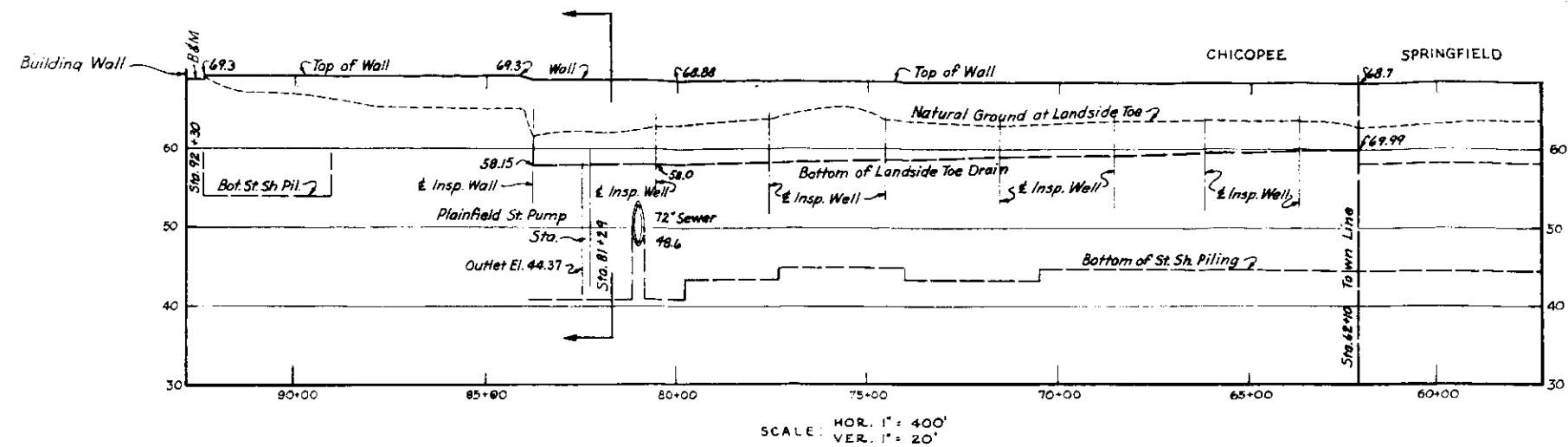
SECTION AT STA. 18+00

TYPICAL FROM STA. 17+70 TO STA. 38+70

CONNECTICUT	RIVER	FLOOD	CONTROL
PROFILE & TYPICAL SECTIONS			
CHICOPEE			
CONNECTICUT	MASSACHUSETTS		
FLOOD EMERGENCY MOBILIZATION PLAN			
PREPARED BY			
CORPS OF ENGINEERS, U.S. ARMY			
OFFICE OF THE DIVISION ENGINEER			
NEW ENGLAND DIVISION, BOSTON, MASS.			



CONNECTICUT RIVER FLOOD CONTROL
PROFILE & TYPICAL SECTIONS
 CHICOPEE
 CONNECTICUT & CHICOPEE RIVERS MASSACHUSETTS
 FLOOD EMERGENCY MOBILIZATION PLAN
 PREPARED BY
 CORPS OF ENGINEERS, U.S. ARMY
 OFFICE OF THE DIVISION ENGINEER
 NEW ENGLAND DIVISION, BOSTON, MASS.



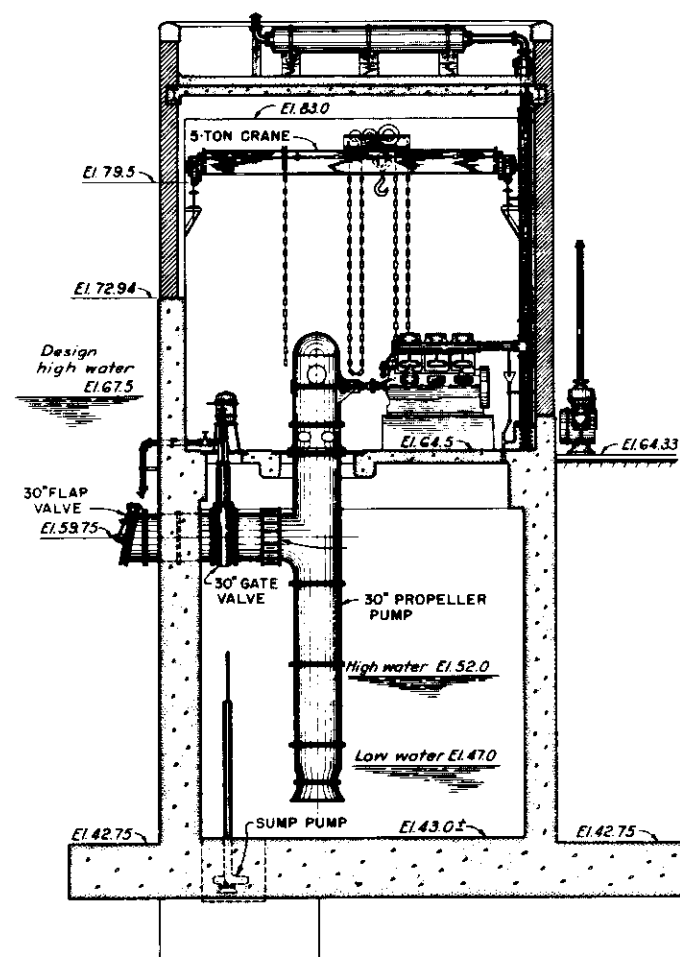
CONNECTICUT RIVER FLOOD CONTROL

PLAINFIELD PUMPING STATION
CHICOPEE, MASS.

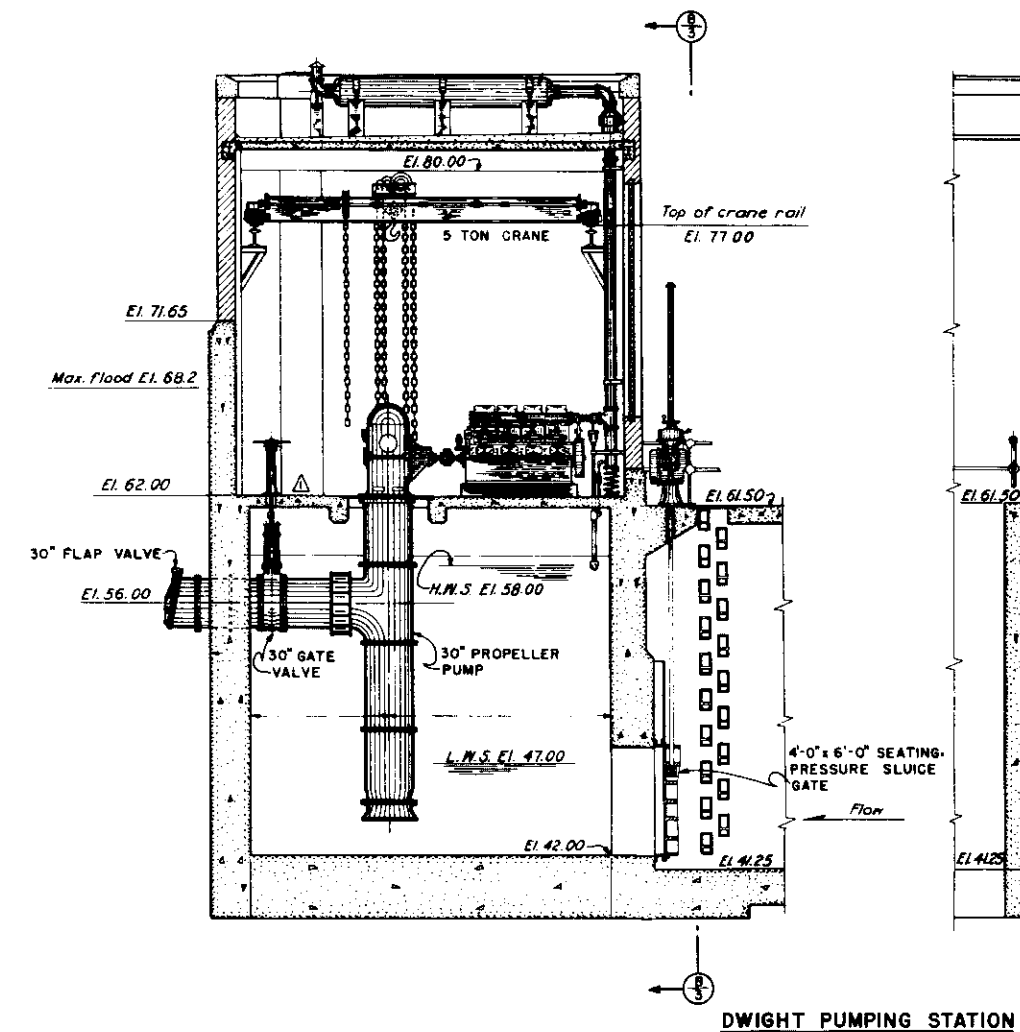
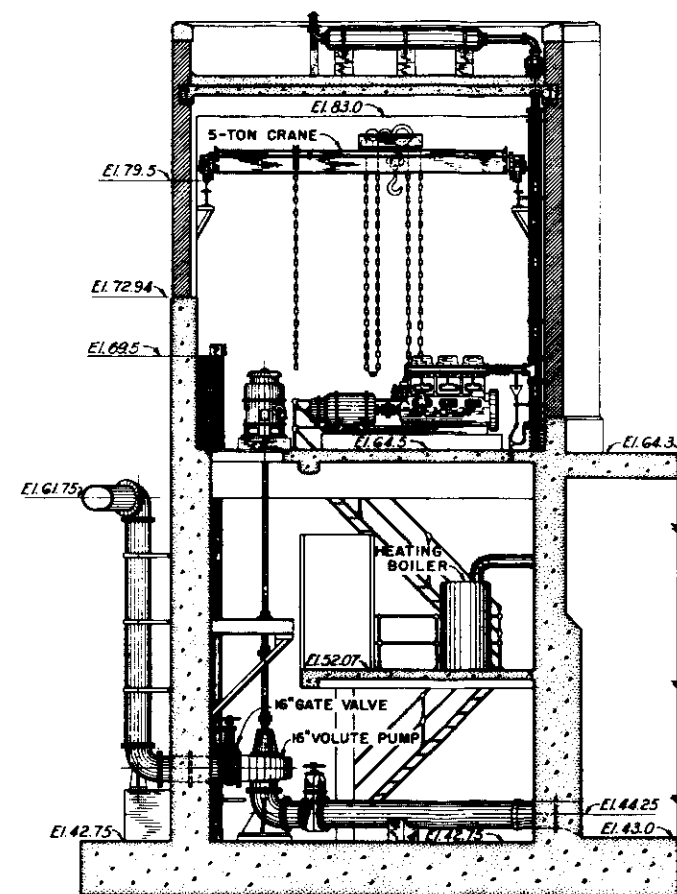
CONNECTICUT RIVER MASSACHUSETTS

FLOOD EMERGENCY MOBILIZATION PLAN

PREPARED BY
CORPS OF ENGINEERS, U.S. ARMY
OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION, BOSTON, MASS.



PADEREWSKI PUMPING STATION

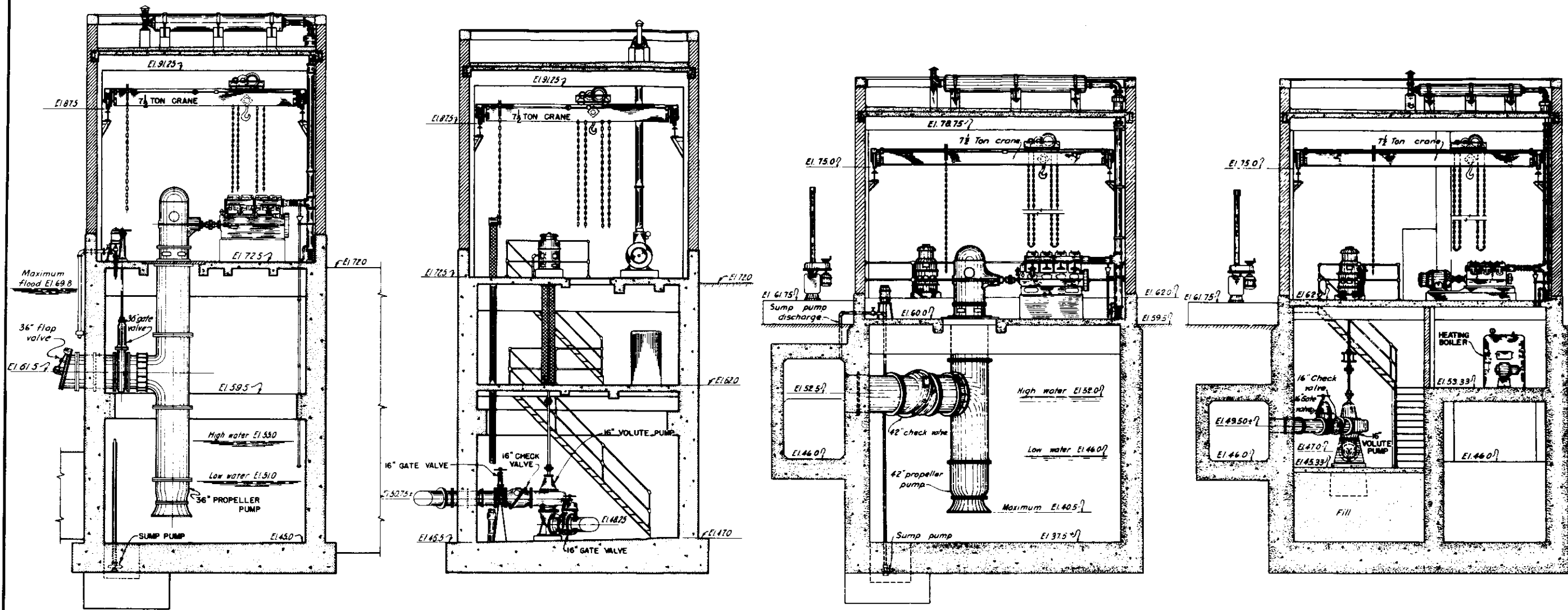
SECTION $\frac{B}{3}$

DWIGHT PUMPING STATION

CONNECTICUT RIVER FLOOD CONTROL
PUMPING STATION EQUIPMENT
CHICOPEE
CONNECTICUT & CHICOPEE RIVERS MASSACHUSETTS

FLOOD EMERGENCY MOBILIZATION PLAN

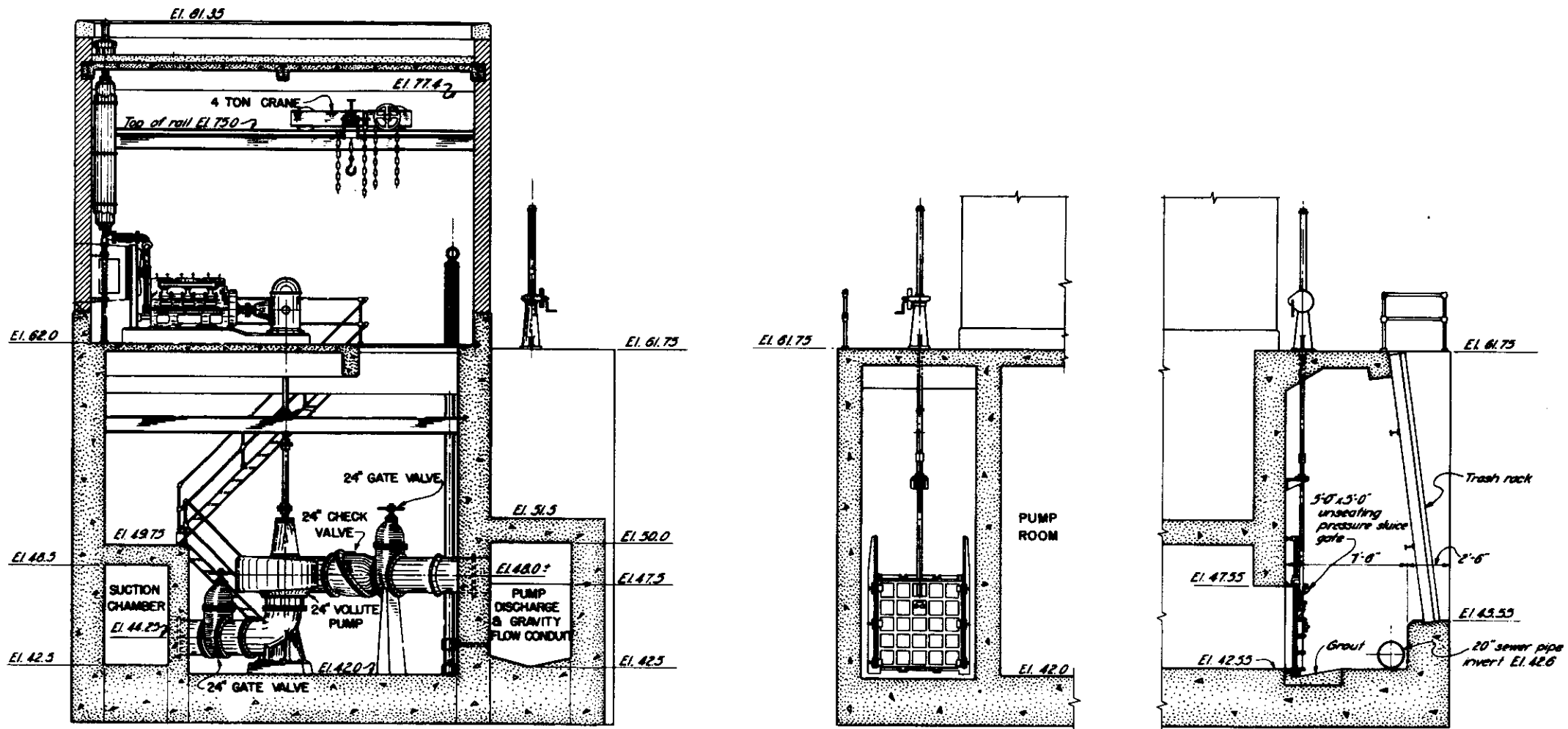
PREPARED BY
CORPS OF ENGINEERS, U.S. ARMY
OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION, BOSTON, MASS.



CALL STREET PUMPING STATION

JONES FERRY PUMPING STATION

CONNECTICUT RIVER FLOOD CONTROL
PUMPING STATION EQUIPMENT
CHICOPEE
CONNECTICUT & CHICOPEE RIVERS MASSACHUSETTS
FLOOD EMERGENCY MOBILIZATION PLAN
PREPARED BY
CORPS OF ENGINEERS, U.S. ARMY
OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION, BOSTON, MASS.



BERTHA AVENUE PUMPING STATION

CONNECTICUT RIVER FLOOD CONTROL
PUMPING STATION EQUIPMENT
CHICOPEE
CONNECTICUT & CHICOPEE RIVERS MASSACHUSETTS
FLOOD EMERGENCY MOBILIZATION PLAN
PREPARED BY
CORPS OF ENGINEERS, U.S. ARMY
OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION, BOSTON, MASS.

HOLYOKE, MASSACHUSETTS, AND VICINITY

Holyoke Flood Protection consists of two separate systems. The North End Section and the South End- Springdale Section are separated by high ground and may be operated independently of each other. The South End and Springdale Sections are contiguous and while separated by an existing dike, each is dependent upon the functioning of the other at extreme stages. This dike, with grade at approximately elevation 72, is substandard in design but may be made reasonably effective by the closure of the stop-log structure on the branch line of the New York, New Haven and Hartford Railroad, and by the construction of three relatively small sandbag closures near Main Street. This closure should be made upon threat of failure of the protective works of either section.

Dike profiles and typical sections, and pumping station details are shown on drawings included in this Manual.

HOLYOKE-NORTH END SECTION. - The North End Section of Holyoke, so-called, is protected by a completed system of dikes, flood walls, raceway gates and pumping stations, as follows:

- 400 linear feet of earth dike
- 5,600 linear feet of concrete wall
- 4 pumping stations (Nos. 1 to 4, inclusive)
- 16 tailrace gates at 9 tailrace outlets
- 17 gated drainage structures
- 5 stop-log openings

The method and sequence of operation is set forth in the Operation and Maintenance Manual for Flood Protection System, issued by this office and furnished to the City.

HOLYOKE-SOUTH END SECTION. - The South End Section of Holyoke, so-called, constituting the river front south of Mosher Street and north of Springdale Dike is protected by a system of flood walls, raceway gates and pumping stations, as follows:

- 4,000 linear feet of concrete wall (River)
- 7,500 linear feet of concrete wall (Canals)
- 2 pumping stations (Nos. 5 and 6)
- 10 intake gates at 6 intake structures
- 10 tailrace gates at 5 tailrace outlets
- 6 gated drainage structures
- 13 stop-log openings
- 3 sandbag openings

February 1953

HOLYOKE-SPRINGDALE SECTION. - The Springdale Section of Holyoke is protected by an earth dike and one pumping station. The dike ties into the concrete floodwall on the South End of Holyoke. The Springdale protective works are as follows:

- 3,800 linear feet of earth dike
- 800 linear feet of concrete wall
- 1 pumping station
- 6 gated drainage structures
- 13 stop-log openings
- 3 sandbag openings

SOUTH HADLEY FALLS. - The concrete wall along South Hadley Falls River front, running upstream and downstream from the Holyoke-South Hadley Falls Bridge (County Bridge) was constructed in 1937 by the W.P.A. Its function is to protect the town from floating ice and debris during high water periods. It is not designed to protect against flood water. No attempt should be made to close the openings in the wall for the purpose of keeping flood water out of the town as such work would create a more serious hazard.

The following record of high water elevations is furnished to provide an approximate relationship between the river stages at Holyoke Dam, at Gill Gage, and at Tailrace No. 22 which is approximately one mile below the dam. Predictions of river stages ordinarily are received from the U. S. Weather Bureau and Holyoke Water Power Company in terms of stage over the Holyoke Dam and the table will provide an approximate conversion. However, too great reliance should not be placed on previous relations between these two stages as the Holyoke tailwater elevation is affected by the discharge of rivers below Holyoke. The elevation of the top of the Holyoke Dam is 97.47 M.S.L.

PREVIOUS HIGH WATER ELEVATIONS

	Stage Over Holyoke Dam	Tailwater Elevation (M.S.L.)	
		At Gill Gage	At Tailrace No. 22
Nov. 1927	14.75	68.6	65.8
Mar. 1936	16.8	76.0	72.3
Sep. 1938	14.9	72.3	69.8
Mar. 1948	11.4	64.0	61.2
Jan. 1949	11.6	65.7	61.9

ESTIMATED SANDBAG REQUIREMENTS

Stop-log closures	8,000
Sandbag closures	2,000
Sand boils and sloughs	3,000
Raising wall one (1) foot	35,000
Raising dike one (1) foot	12,000
TOTAL	60,000

Recommended stock level for storage-10,000 to 15,000
On hand 10 January 1953 - 9,150

February 1953

FLOOD FREQUENCIES DURING MARCH - JUNE
based on records from 1869-1938, incl.

<u>Frequency</u>	<u>Elev. M.S.L.*</u>
Annual	61.5
2 years	62.2
5 years	64.5
10 years	66.6
20 years	68.2
50 years	71.0

*At the location of the Gill Gage. The
Gill Gage reads in Holyoke City Datum,
of which the zero is elevation minus
2.58' M.S.L.

Note: Gage numbers in pumping stations
correspond to the number of the
pumping station.

February 1951

CITY OF HOLYOKE

Holyoke
Exchange

Mayor: Edwin A. Seibel
City Hall

(Res.) 356 Hillside Ave.

2-5588
2-6580

Superintendent of Maintenance and Operations of
Flood Protection System:

Edward A. Maher

City Engineer

City Hall Annex

(Res.) Mountain View Drive

2-5921
2-6219

Superintendent of Public Works:

E. J. Bayon

Commercial Street

(Res.) 45 North Pleasant Street

4575
2-7730

Pumping Station Operator:

J. J. Kelly

(Res.) 127 Sargent Street

2-8860

Pumping Station No. 1:

3-0032

Pumping Station No. 2:

3-1716

Pumping Station No. 3:

3-1854

Pumping Station No. 4:

3-0407

Pumping Station No. 5:

2-8741

Pumping Station No. 6:

2-9124

Springdale Pumping Station:

3-0853

Hydraulic Engineer of Holyoke Water Power Company:

Allin W. Ladd

1 Canal Street

(Res.) 18 Carter Street

2-2973
6618

Note: Mr. Ladd has in his office a remote control gage showing flow over Holyoke Dam and receives from the N. E. Power Association gage readings twice daily for all N.E.P.A. dams on the Connecticut River. Also has a remote control indicator from the U.S.G.S. Gage at Montague City.

Red Cross Headquarters: 380 High Street

Nights, Sundays and Holidays

4531
2-7103

INDEX

1. Stop Log Structure No. 17 - Sill Elevation 110.0±
2. Stop Log Structure No. 1 - Sill Elevation 69.2±
3. Pumping Station No. 1 and Tailrace Structure No. 1
4. Stop Log Structure No. 2 - Sill Elevation 72.0
5. Stop Log Structure No. 3 - Sill Elevation 72.0±
6. Pumping Station No. 2 and Tailrace Structure No. 4
7. Stop Log Structure No. 4 - Sill Elevation 65.2±
8. Tailrace Structure No. 6
9. Stop Log Structure No. 5 - Sill Elevation 64.0±
10. Pumping Station No. 3 and Tailrace Structure No. 7
11. Tailrace Structure No. 8
12. Tailrace Structure No. 9
13. Pumping Station No. 4 and Tailrace Structure No. 10
14. Tailrace Structure No. 11
15. Tailrace Structure No. 12
16. Stop Log Structure No. 6 - Sill Elevation 66.1
17. Tailrace Structure No. 16
18. Pumping Station No. 5
19. Tailrace Structure No. 18
20. Stop Log Structure No. 7 - Sill Elevation 65.0
21. Stop Log Structure No. 8 - Sill Elevation 69.0
22. Stop Log Structure No. 9 - Sill Elevation 70.1
23. Intake Structure No. 18
24. Intake Structure No. 16
25. Stop Log Structure No. 10 - Sill Elevation 70.8
26. Stop Log Structure No. 11 - Sill Elevation 70.8
27. Sand Bag Opening No. 2 - Sill Elevation 71.9
28. Sand Bag Opening No. 1 - Sill Elevation 72.4
29. Sand Bag Opening Nos. 4, 5 and 6
30. Sand Bag Opening Nos. 7 and 8
31. Sand Bag Opening No. 9
32. Sand Bag Opening No. 3
33. Intake Structure No. 25
34. Intake Structure No. 24
35. Stop Log Structure No. 12 - Sill Elevation 71.2
36. Intake Structure No. 22
37. Conduit Intake No. 21
38. Stop Log Structure No. 13 - Sill Elevation 70.9
39. Intake Structure No. 19
40. Stop Log Structure No. 14 - Sill Elevation 70.1
41. Stop Log Structure No. 15 - Sill Elevation 69.0
42. Stop Log Structure No. 16 - Sill Elevation 64.5
43. Tailrace Structure No. 19
44. Conduit Outlet No. 21
45. Tailrace Structure No. 22
46. Pumping Station No. 6
47. Tailrace Structure No. 24
48. Stop Log Structure No. 18 - Sill Elevation 62.6
49. Berkshire Street Sewer Outlet
50. Springdale Pumping Station

NOTES

The flood protection system constructed by Corps of Engineers extends from the First Level Canal spillway at Holyoke W. P. Co. dam to high ground at Mosher Street and from high ground about 600' upstream from the B. & M. R.R. Bridge to high ground south of Riverside Park. The flood control works consists principally of concrete walls and earth dikes and include seven pumping stations and twenty-two gate structures.

Maintenance and operation of the entire system is the responsibility of the City of Holyoke.

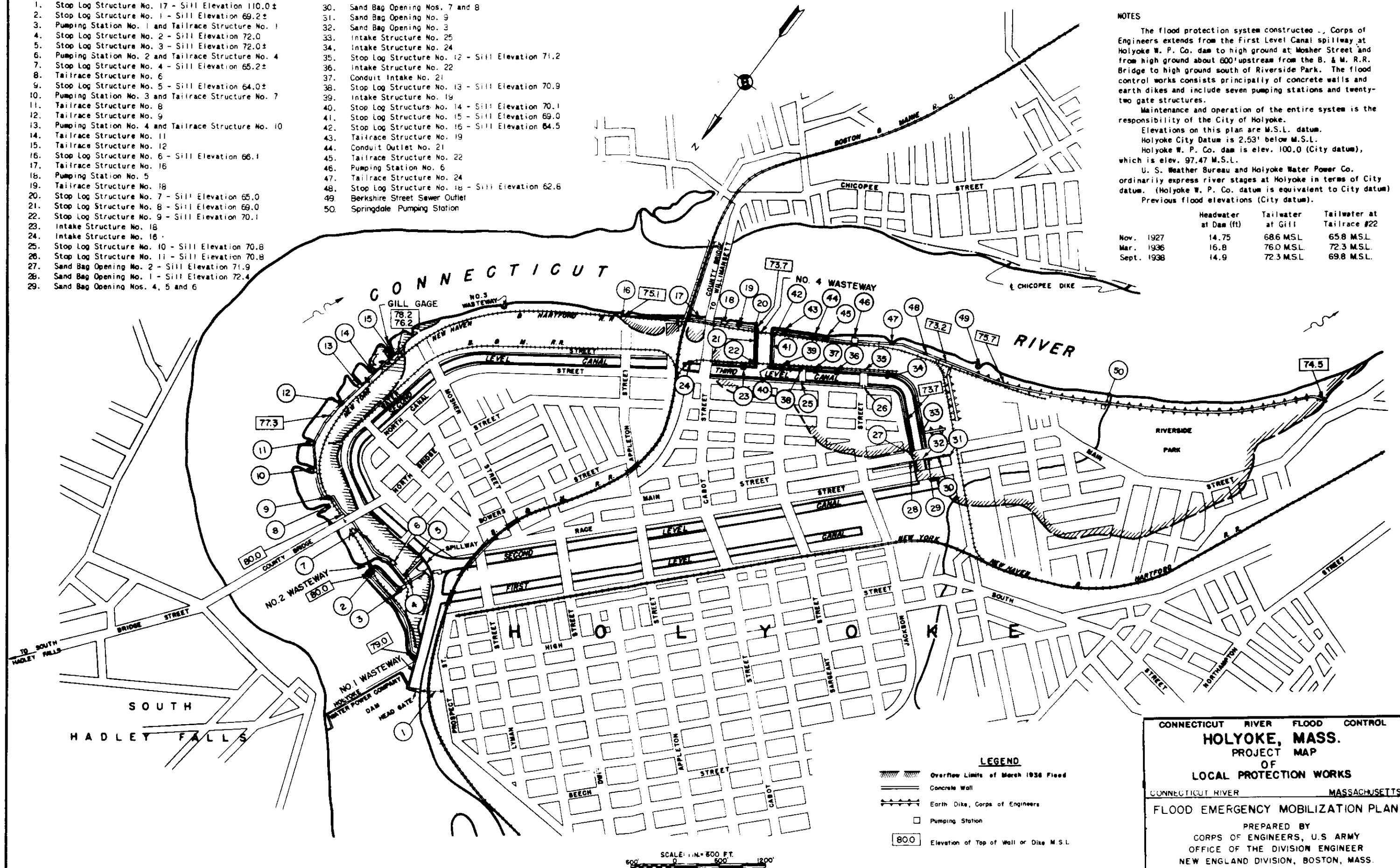
Elevations on this plan are M.S.L. datum.

Holyoke City Datum is 2.53' below M.S.L.

Holyoke W. P. Co. dam is elev. 100.0 (City datum), which is elev. 97.47 M.S.L.

U. S. Weather Bureau and Holyoke Water Power Co. ordinarily express river stages at Holyoke in terms of City datum. (Holyoke W. P. Co. datum is equivalent to City datum) Previous flood elevations (City datum).

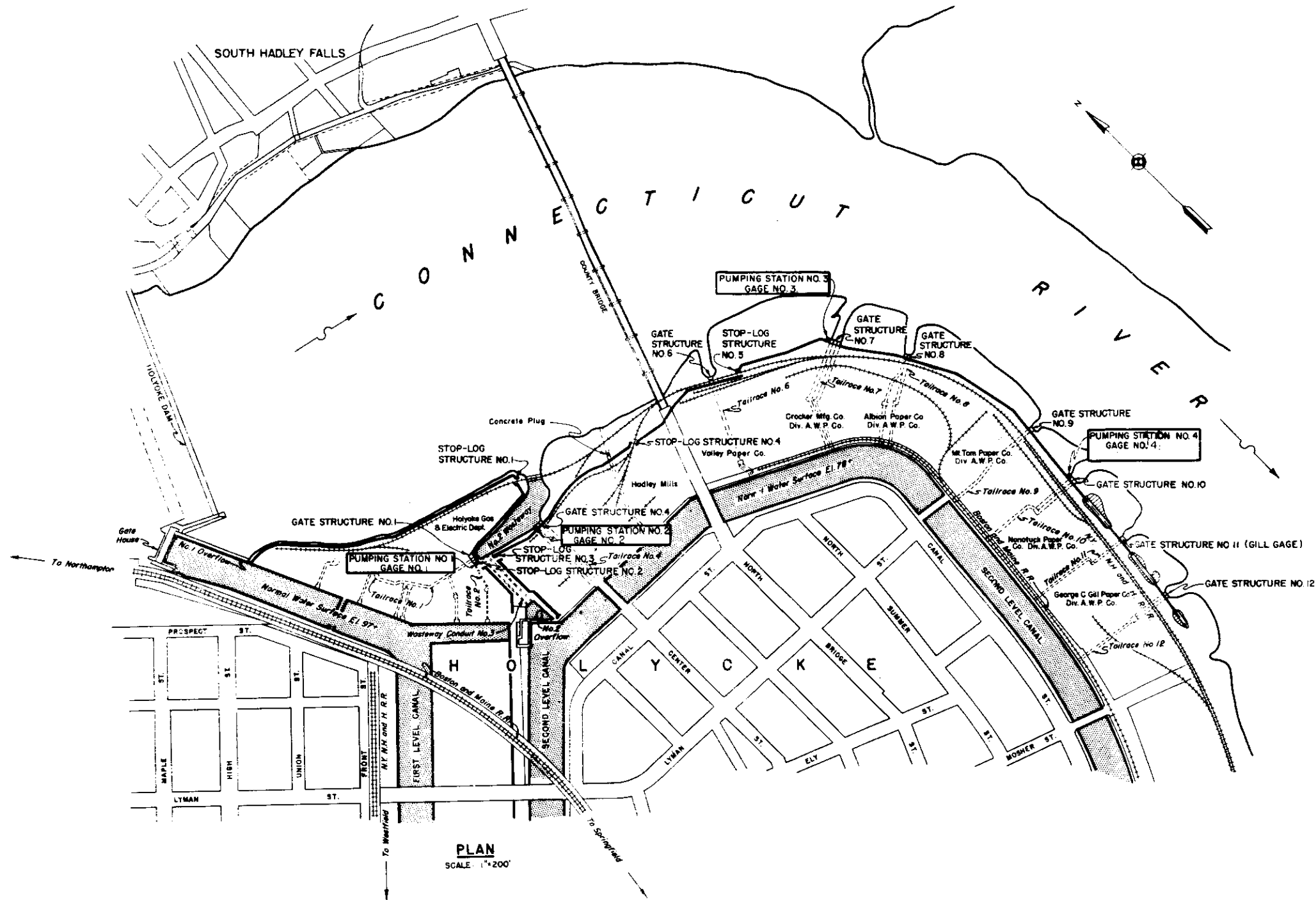
	Headwater at Dam (ft)	Tailwater at Gill	Tailwater at Tailrace #22
Nov. 1927	14.75	686 MSL	65.8 MSL
Mar. 1936	16.8	760 MSL	72.3 MSL
Sept. 1938	14.9	72.3 MSL	69.8 MSL



CONNECTICUT RIVER FLOOD CONTROL
HOLYOKE, MASS.
 PROJECT MAP
 OF
 LOCAL PROTECTION WORKS

CONNECTICUT RIVER MASSACHUSETTS
FLOOD EMERGENCY MOBILIZATION PLAN

PREPARED BY
 CORPS OF ENGINEERS, U.S. ARMY
 OFFICE OF THE DIVISION ENGINEER
 NEW ENGLAND DIVISION, BOSTON, MASS.



NOTES

- The protection works will be operated when the predicted flood crest equals or exceeds a river stage of 61.0 on Gage No. 3.
- Gages 1, 2, 3, and 4 are all referred to Mean Sea Level Datum.
All elevations shown are referred to Mean Sea Level Datum.
Gill Gage is a recording gage operated by the Gill Div. A.W.P. Co., and is referred to City of Holyoke Datum.
City of Holyoke Datum is 2.53 feet below Mean Sea Level.
- Crest of Holyoke Dam — Elevation 97.47 Mean Sea Level Datum.
Elevation 100.00 City of Holyoke Datum.
- Constituent Areas — Pumping Station No. 1 Area includes the City Gas Works and the Parsons Div. of the American Writing Paper Co.
Pumping Station No. 2 Area extends from Wasteway No. 2 to the South Hadley Falls Bridge and includes the Hadley group of mills.
Pumping Station No. 3 Area extends from South Hadley Falls Bridge to the Albion Div. of the American Writing Paper Co.
Pumping Station No. 4 Area extends from above Mt. Tom mill to high ground below the Gill Div. of the American Writing Paper Co.

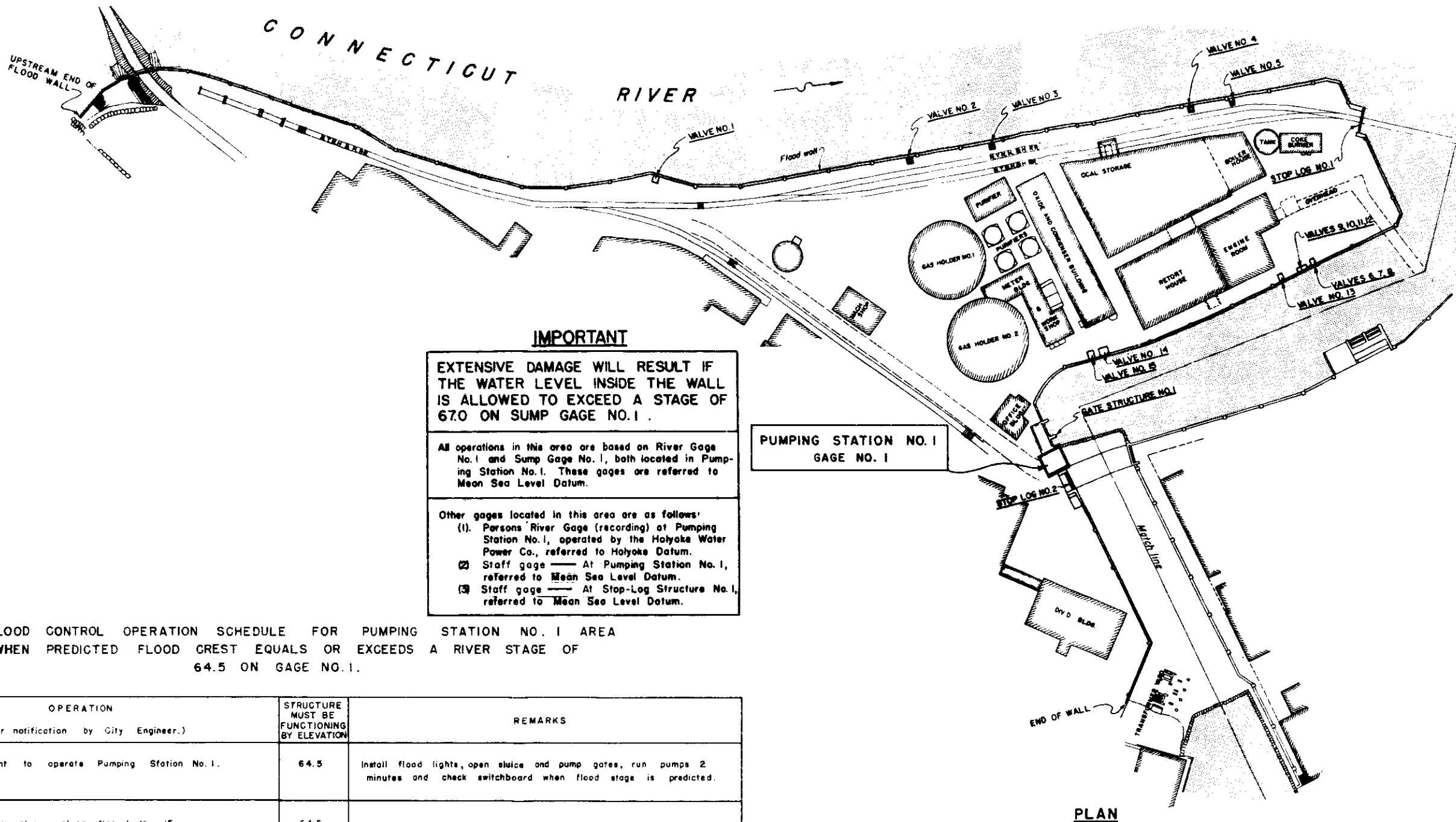
LEGEND

- Concrete flood wall
- Earth dike
- Railroad

CONNECTICUT RIVER FLOOD CONTROL
HOLYOKE DIKE
GENERAL PLAN
FLOOD OPERATION
HOLYOKE MASSACHUSETTS

FLOOD EMERGENCY MOBILIZATION PLAN

PREPARED BY
CORPS OF ENGINEERS, U.S. ARMY
OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION, BOSTON, MASS
FEB 1954.



IMPORTANT

EXTENSIVE DAMAGE WILL RESULT IF THE WATER LEVEL INSIDE THE WALL IS ALLOWED TO EXCEED A STAGE OF 67.0 ON SUMP GAGE NO. 1.

All operations in this area are based on River Gage No. 1 and Sump Gage No. 1, both located in Pumping Station No. 1. These gages are referred to Mean Sea Level Datum.

Other gages located in this area are as follows:

- (1). Parsons River Gage (recording) at Pumping Station No. 1, operated by the Holyoke Water Power Co., referred to Holyoke Datum.
- (2) Staff gage — At Pumping Station No. 1, referred to Mean Sea Level Datum.
- (3) Staff gage — At Stop-Log Structure No. 1, referred to Mean Sea Level Datum.

FLOOD CONTROL OPERATION SCHEDULE FOR PUMPING STATION NO. 1 AREA
WHEN PREDICTED FLOOD CREST EQUALS OR EXCEEDS A RIVER STAGE OF 64.5 ON GAGE NO. 1.

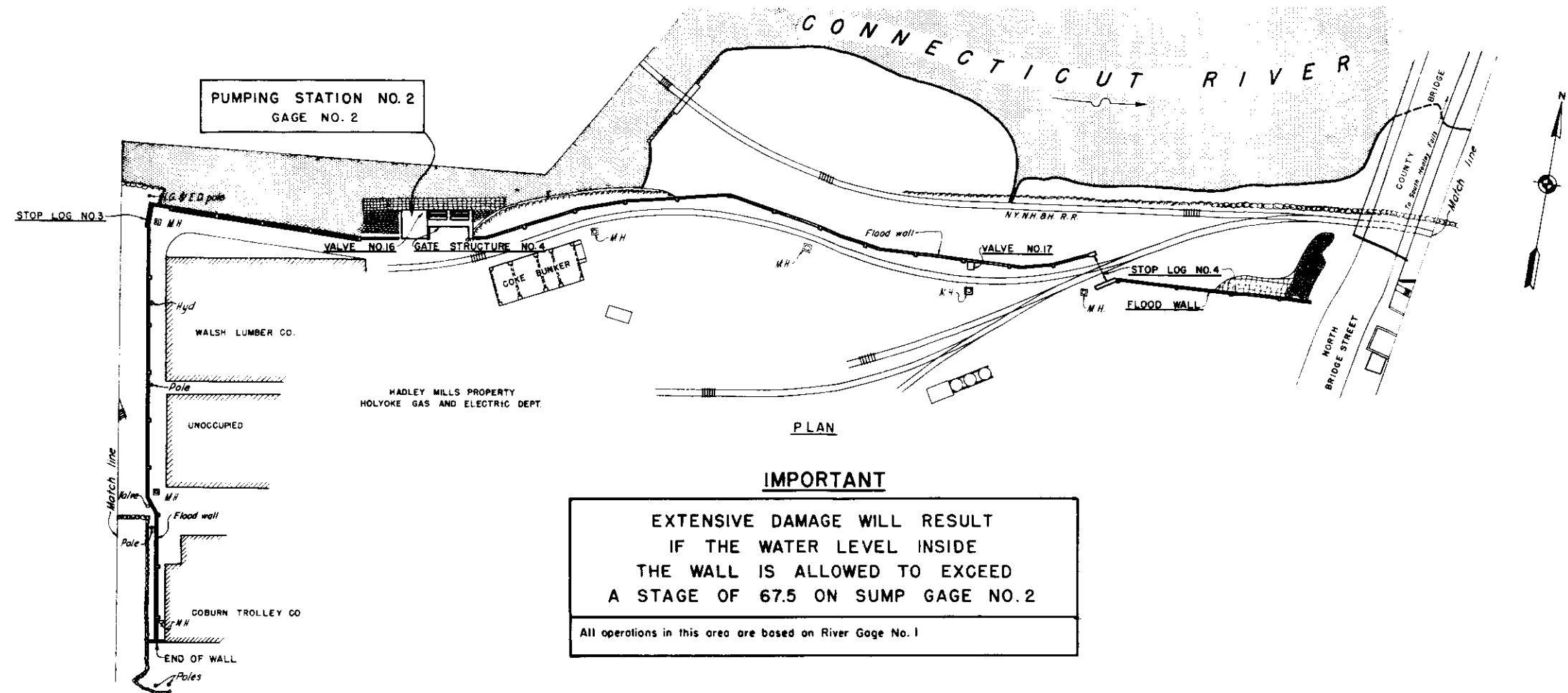
OPERATION (After notification by City Engineer.)	STRUCTURE MUST BE FUNCTIONING BY ELEVATION	REMARKS
Electric Department to operate Pumping Station No. 1.	64.5	Install flood lights, open sluice and pump gates, run pumps 2 minutes and check switchboard when flood stage is predicted.
Gas Department to close valves Nos. 1 thru 15.	64.5	
American Writing Paper Company to close headgates of Raceways Nos. 1 & 2 and City Yard forces to close tailgates of Raceway No. 1.	65.0	Gates must be lubricated and lowered into position above water level, sills and bronze seats checked when flood stage is predicted.
Gas Department to close stop-log opening No. 1.	69.0	N.Y.N.H.&H. R.R. to be notified.
Gas Department to close stop-log opening No. 2.	72.0	
AT HOLYOKE DAM		
Boston & Maine Railroad to close stop-log No. 17.	110.0 M.S.L. 112.5 on Holyoke Dam Gage	Ballast over concrete sill and in front of same to be replaced with sandbags to track level before elevation 109.5 is reached. The City Yard is to deliver sandbags and sand to the B & M R.R. near Desjardins Hopper at Mosher and Bower Streets. The R.R. is to transport it from there.

CONNECTICUT RIVER FLOOD CONTROL
HOLYOKE DIKE
PUMPING STATION NO. 1 AREA
FLOOD OPERATION SCHEDULE
HOLYOKE MASSACHUSETTS

SCALE IN FEET
0 20 40 60

FLOOD EMERGENCY MOBILIZATION PLAN

PREPARED BY
CORPS OF ENGINEERS, U.S. ARMY
OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION, BOSTON, MASS.



IMPORTANT

EXTENSIVE DAMAGE WILL RESULT
IF THE WATER LEVEL INSIDE
THE WALL IS ALLOWED TO EXCEED
A STAGE OF 67.5 ON SUMP GAGE NO. 2
All operations in this area are based on River Gage No. 1

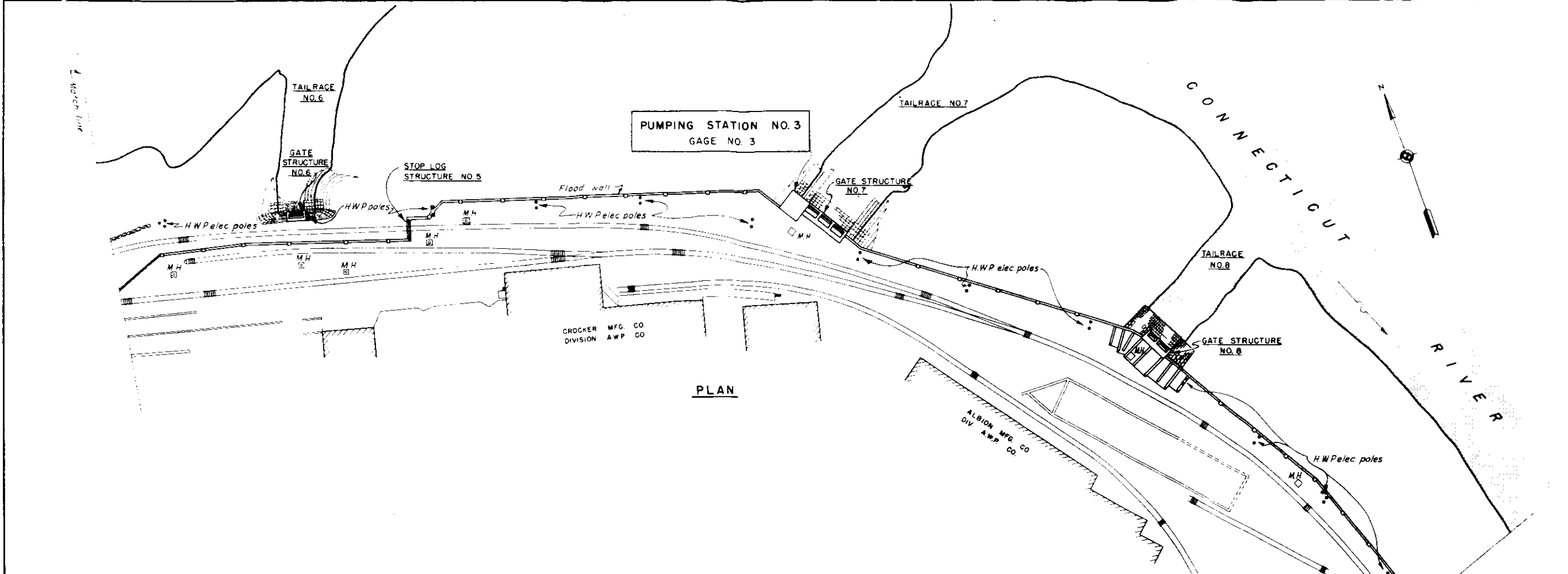
FLOOD CONTROL OPERATION SCHEDULE FOR PUMPING STATION NO. 2 AREA
WHEN PREDICTED FLOOD CREST EQUALS OR EXCEEDS A RIVER STAGE OF 64.5
ON GAGE NO. 1.

OPERATION (After notification by City Engineer.)	STRUCTURE MUST BE FUNCTIONING BY ELEVATION	REMARKS
Gas Department to close valves Nos. 16 and 17	64.5	
Gas Department to close stop-log opening No. 4.	64.5	N.Y.N.H.B.H. Railroad to be notified.
Gas Department to close headgates and City Yard forces to close tailgates of Raceway No. 4.	65.0	Gates must be lubricated and lowered into position above water level, sills and bronze seats checked when flood stage is predicted.
Electric Department to operate Pumping Station No. 2.	65.5	Install flood lights, open sluice and pump gates, run pumps 2 minutes and check switchboard when flood stage is predicted.
Gas Department to close stop-log opening No. 3.	72.0	

CONNECTICUT RIVER FLOOD CONTROL
HOLYOKE DIKE
PUMPING STATION NO. 2 AREA
FLOOD OPERATION SCHEDULE
HOLYOKE MASSACHUSETTS

SCALE IN FEET
0 40 80

FLOOD EMERGENCY MOBILIZATION PLAN
PREPARED BY
CORPS OF ENGINEERS, U.S. ARMY
OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION, BOSTON, MASS.



FLOOD CONTROL OPERATION SCHEDULE FOR PUMPING STATION NO. 3 AREA
WHEN PREDICTED FLOOD CREST EQUALS OR EXCEEDS A RIVER STAGE OF 61.0
ON GAGE NO. 3.

OPERATION (After notification by City Engineer)	STRUCTURE MUST BE FUNCTIONING BY ELEVATION	REMARKS
Electric Department to operate Pumping Station No. 3	61.0	Install flood lights, open sluice and pump gates, run pumps 2 minutes and check switchboard when flood stage is predicted.
Valley Paper Company to close headgates of Raceway No. 6. American Writing Paper Company to close headgates of Raceways No. 7 and 8. City Yard forces to close tailgates of Raceway Nos. 6, 7 & 8.	62.0	Gates must be lubricated and lowered into position above water level, pins and bronze seats checked when flood stage is predicted.
City Yard forces to close stop-log opening No. 5.	63.5	N.Y.N.H.&H Railroad to be notified.

IMPORTANT

EXTENSIVE DAMAGE WILL RESULT IF THE WATER LEVEL INSIDE THE WALL IS ALLOWED TO EXCEED A STAGE OF 66.0 ON SUMP GAGE NO. 3

All operations in this area are based on River Gage No. 3 and Sump Gage No. 3 both located in Pumping Station No. 3. These gages are referred to Mean Sea Level Datum.

Other gages located in this area are as follows:

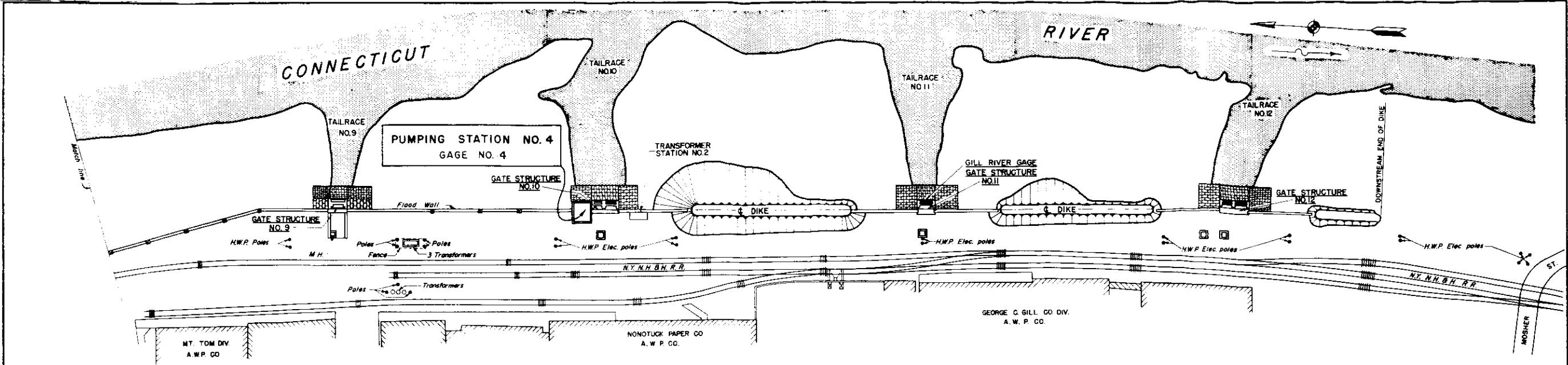
(1) Valley River Gage (recording) at Gate Structure No. 6, operated by the Holyoke Water Power Co., and referred to Holyoke Datum.

(2) Staff gage — At Gate Structure No. 6, and referred to Mean Sea Level Datum.

CONNECTICUT RIVER FLOOD CONTROL
HOLYOKE DIKE
PUMPING STATION NO. 3 AREA
FLOOD OPERATION SCHEDULE
HOLYOKE MASSACHUSETTS

SCALE 1 IN FEET
0 20 40 60

FLOOD EMERGENCY MOBILIZATION PLAN
PREPARED BY
CORPS OF ENGINEERS, U.S. ARMY
OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION, BOSTON, MASS.



PLAN

FLOOD CONTROL OPERATION SCHEDULE FOR PUMPING STATION NO. 4 AREA
WHEN PREDICTED FLOOD CREST EQUALS OR EXCEEDS A RIVER STAGE OF
64.0 ON GAGE NO.3.

OPERATION (After notification by City Engineer.)	STRUCTURE MUST BE FUNCTIONING BY ELEVATION	REMARKS
Electric Department to operate Pumping Station No. 4.	64.0	Install flood lights, open sluice and pump gates, run pumps 2 minutes and check switchboard when flood stage is predicted.
American Writing Paper Company to close headgates and City Yard force to close tailgates of Raceways Nos. 9,10,11 & 12.	65.0	Gates must be lubricated and lowered in position above water level, sills and bronze seats checked, when flood stage is predicted.

IMPORTANT

EXTENSIVE DAMAGE WILL RESULT IF THE WATER LEVEL INSIDE THE WALL IS ALLOWED TO EXCEED A STAGE OF 67.0 ON SUMP GAGE NO.4

All operations in this area are based on River Gage No. 3

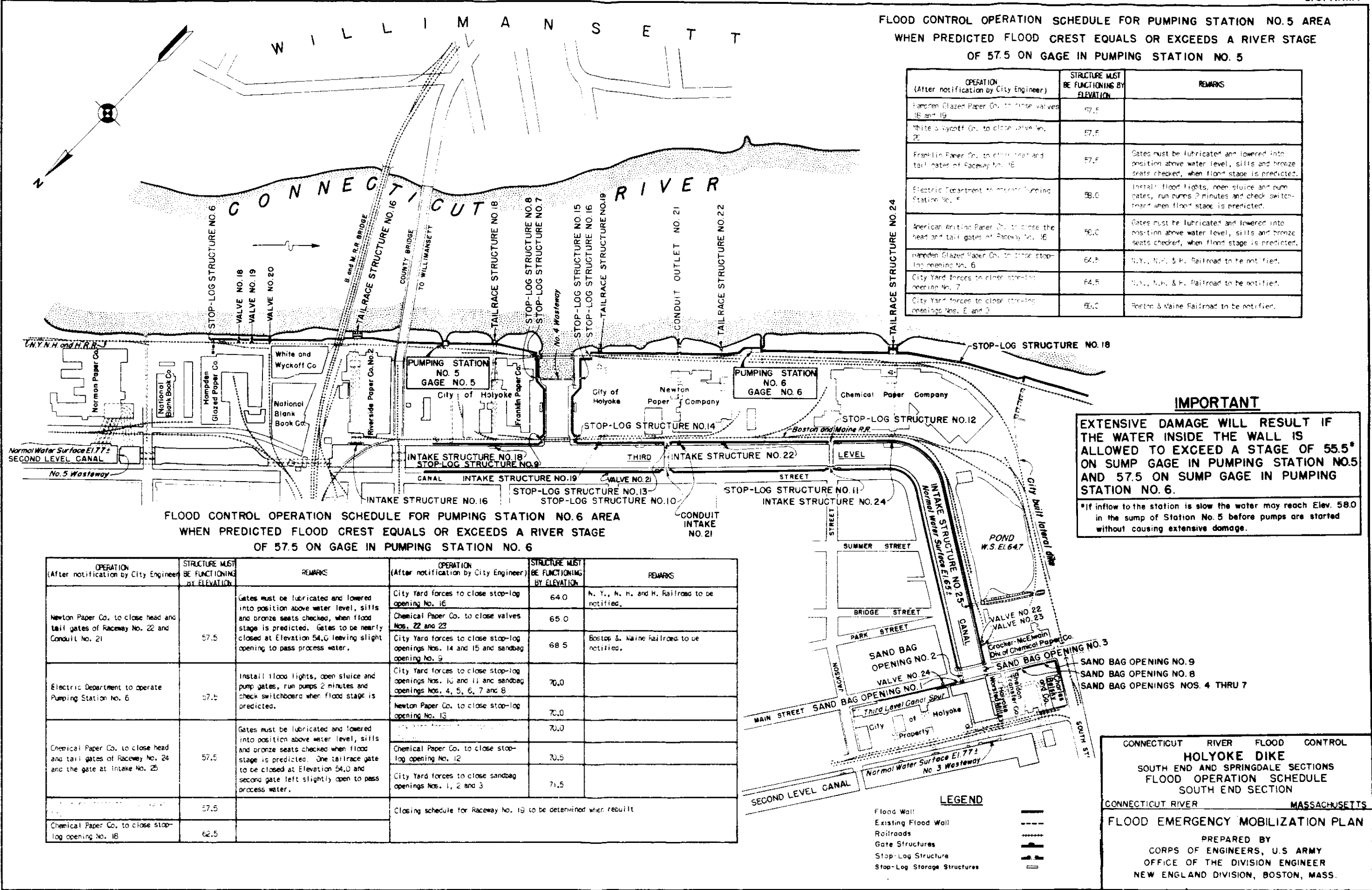
Other gages located in this area are as follows:
(1). Gill River Gage (recording) at Gate Structure No.11, operated by the Holyoke Water Power Co., and referred to Holyoke Datum.
(2) Gage No. A (staff) at Gate Structure No.12, and referred to Mean Sea Level Datum.

CONNECTICUT RIVER FLOOD CONTROL
HOLYOKE DIKE
PUMPING STATION NO. 4 AREA
FLOOD OPERATION SCHEDULE
HOLYOKE MASSACHUSETTS

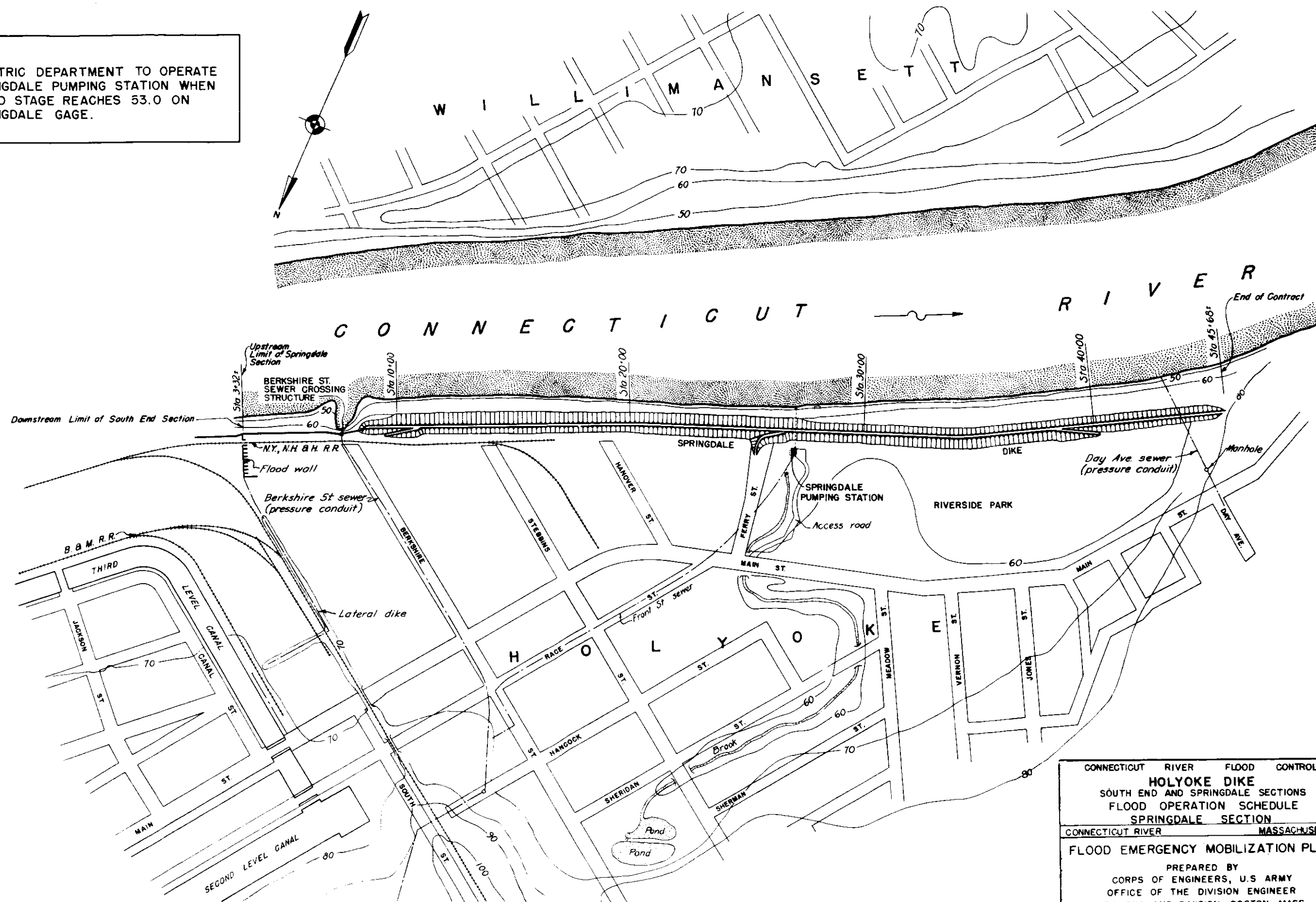
SCALE IN FEET
0 40 80

FLOOD EMERGENCY MOBILIZATION PLAN

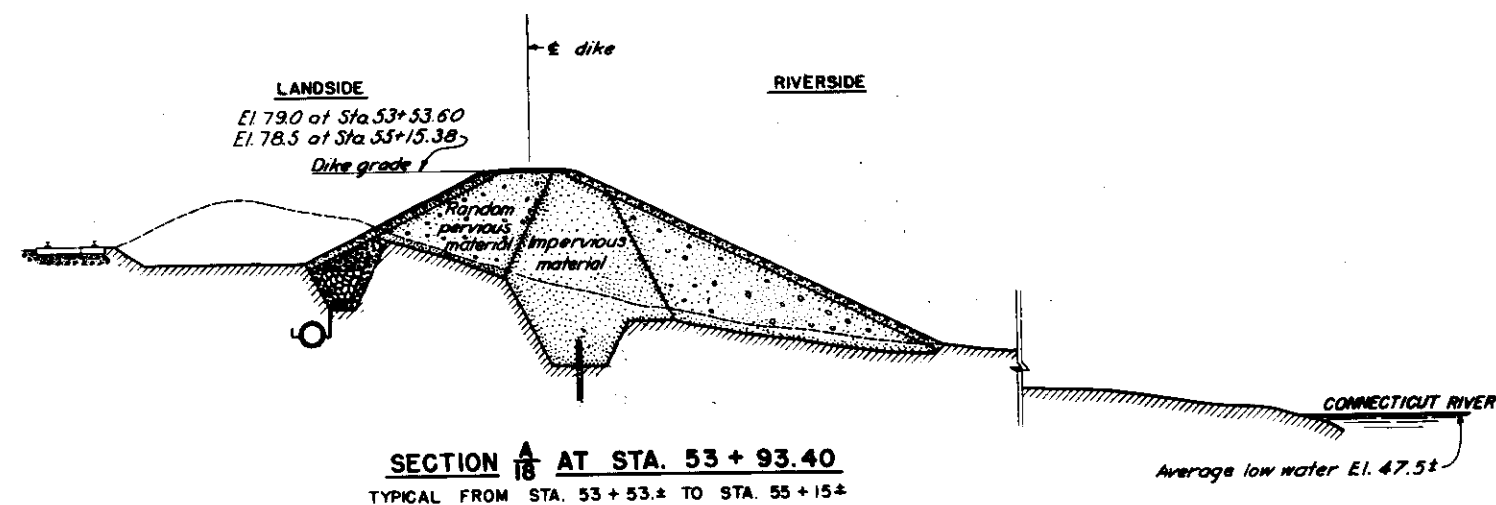
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NEW ENGLAND DIVISION, BOSTON, MASS.



ELECTRIC DEPARTMENT TO OPERATE
SPRINGDALE PUMPING STATION WHEN
FLOOD STAGE REACHES 53.0 ON
SPRINGDALE GAGE.



CONNECTICUT RIVER FLOOD CONTROL
HOLYOKE DIKE
 SOUTH END AND SPRINGDALE SECTIONS
 FLOOD OPERATION SCHEDULE
SPRINGDALE SECTION
 CONNECTICUT RIVER MASSACHUSETTS
FLOOD EMERGENCY MOBILIZATION PLAN
 PREPARED BY
 CORPS OF ENGINEERS, U.S. ARMY
 OFFICE OF THE DIVISION ENGINEER
 NEW ENGLAND DIVISION, BOSTON, MASS.



CONNECTICUT RIVER FLOOD CONTROL

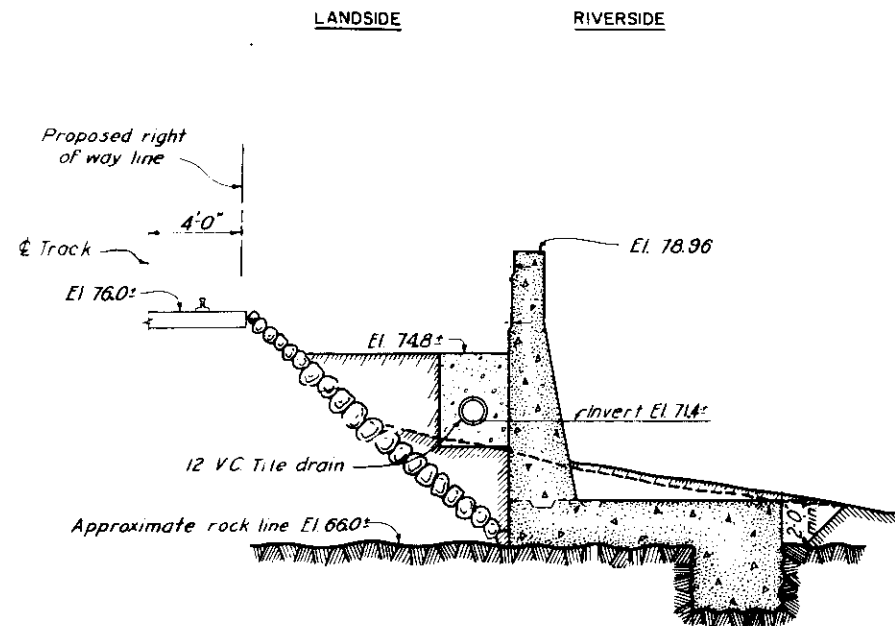
HOLYOKE DIKE

PROFILES & TYPICAL SECTIONS

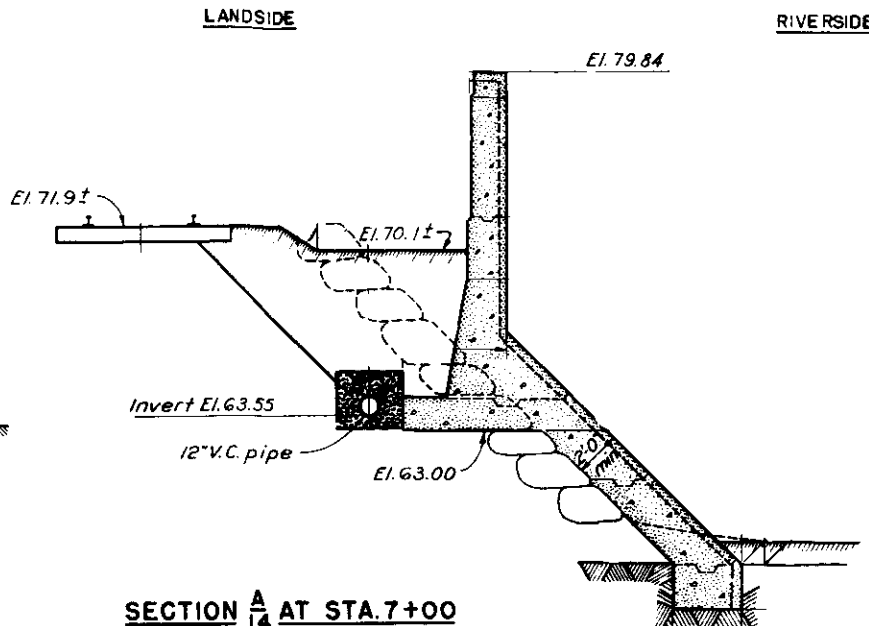
CONNECTICUT RIVER MASSACHUSETTS

FLOOD EMERGENCY MOBILIZATION PLAN

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OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION, BOSTON, MASS.

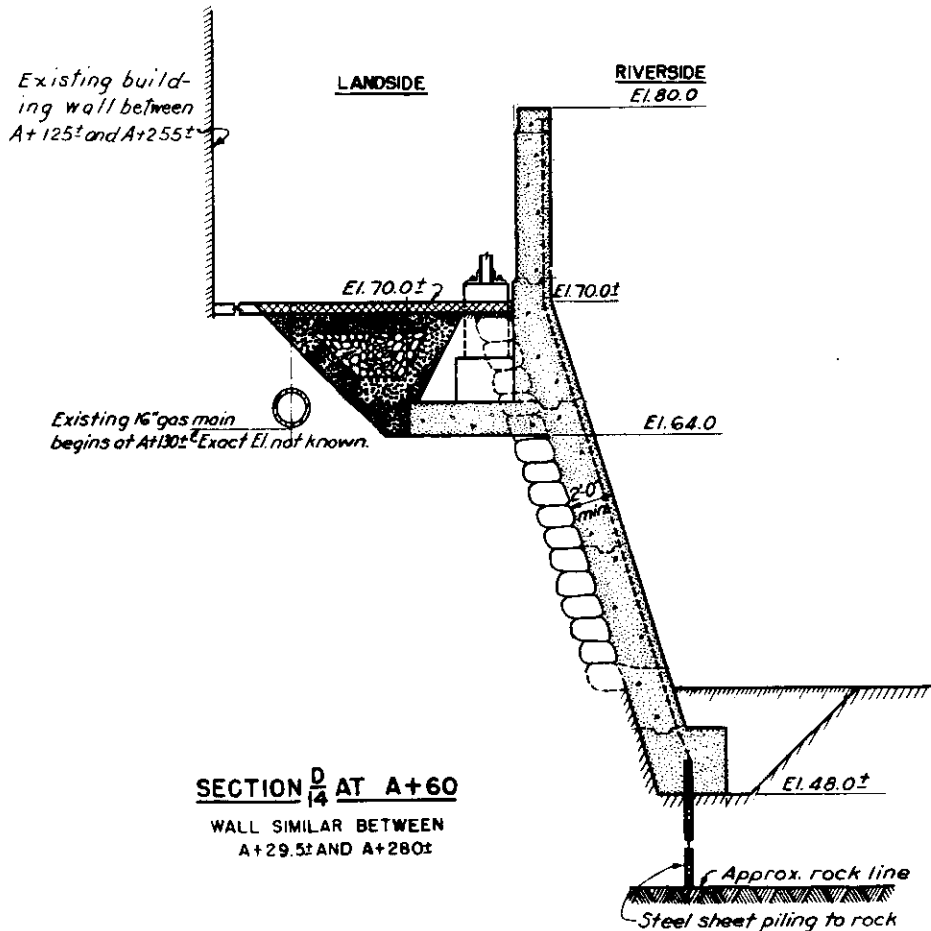


SECTION AT STA. 1+70



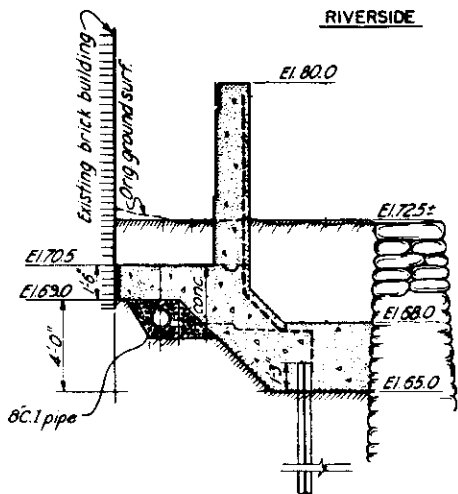
SECTION A₁₄ AT STA. 7+00

WALL SIMILAR BETWEEN
STA. 5+89.74 AND STA. 9+10±



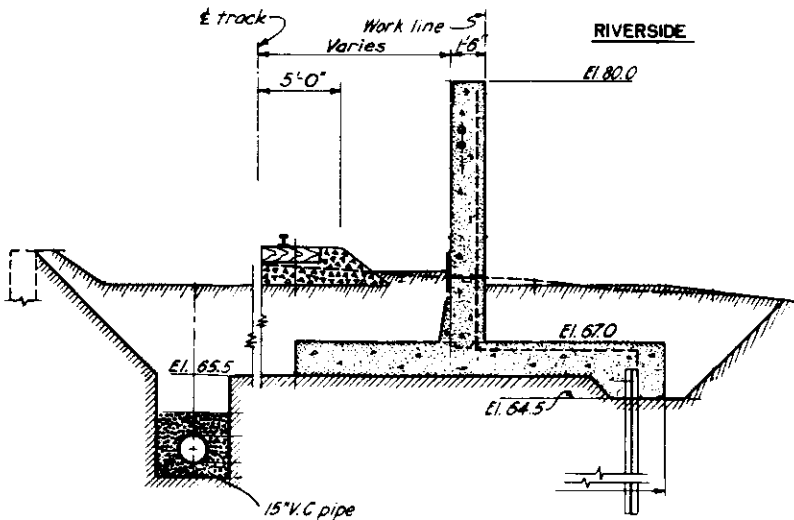
SECTION D₁₄ AT A+60

WALL SIMILAR BETWEEN
A+29.5± AND A+280±



SECTION A₁₅ STA. 20+75

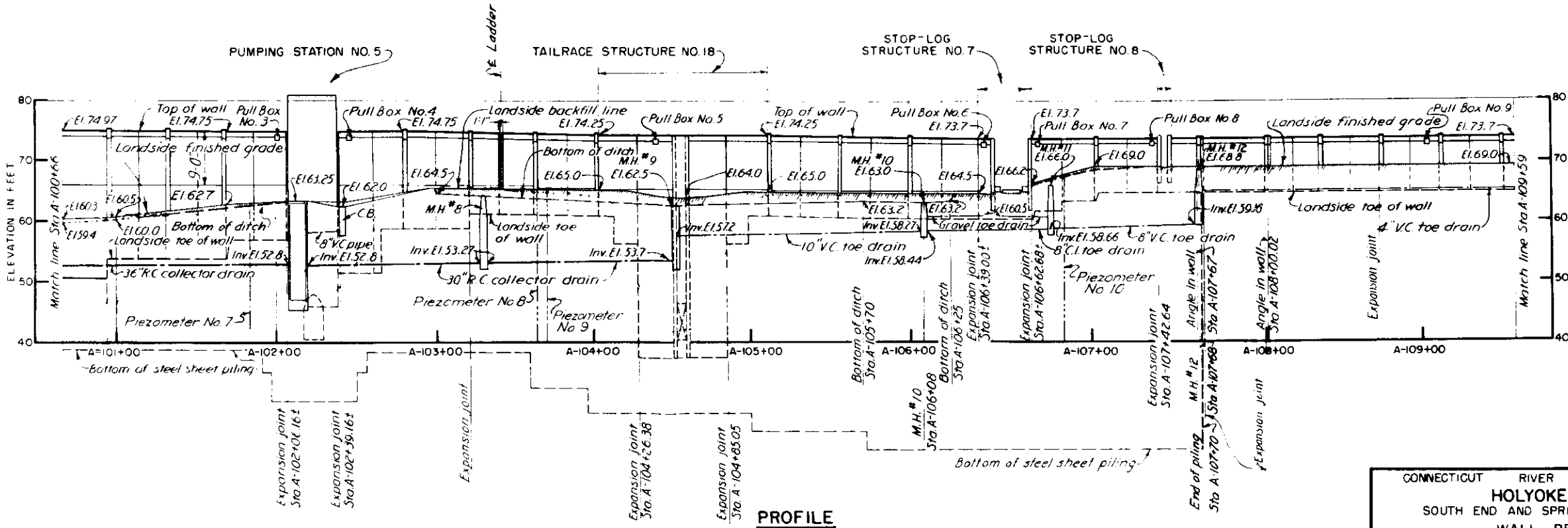
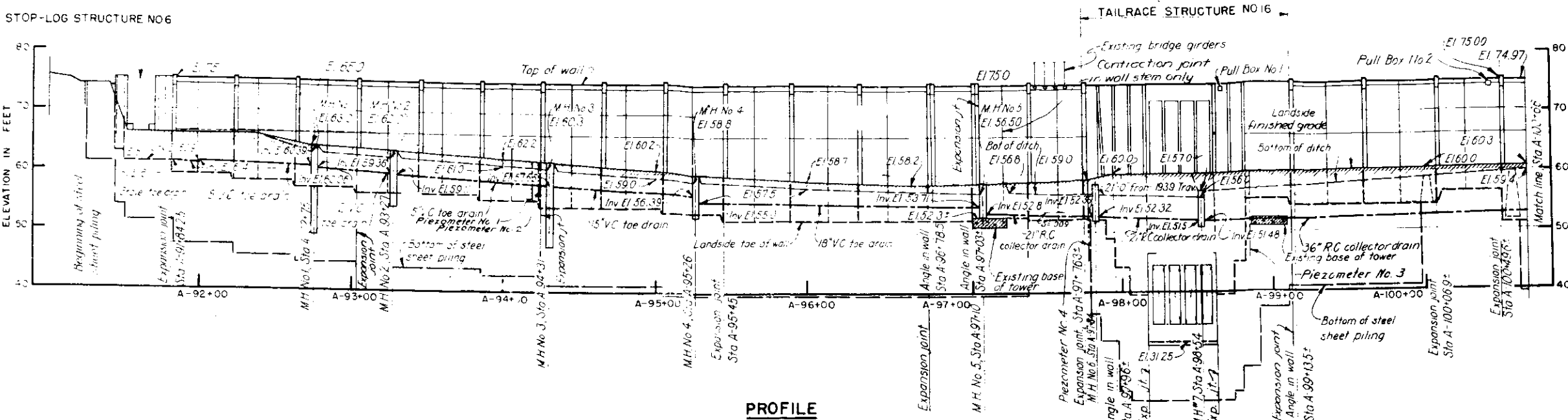
FROM STA. 20+31± TO STA. 21+18± SIMILAR



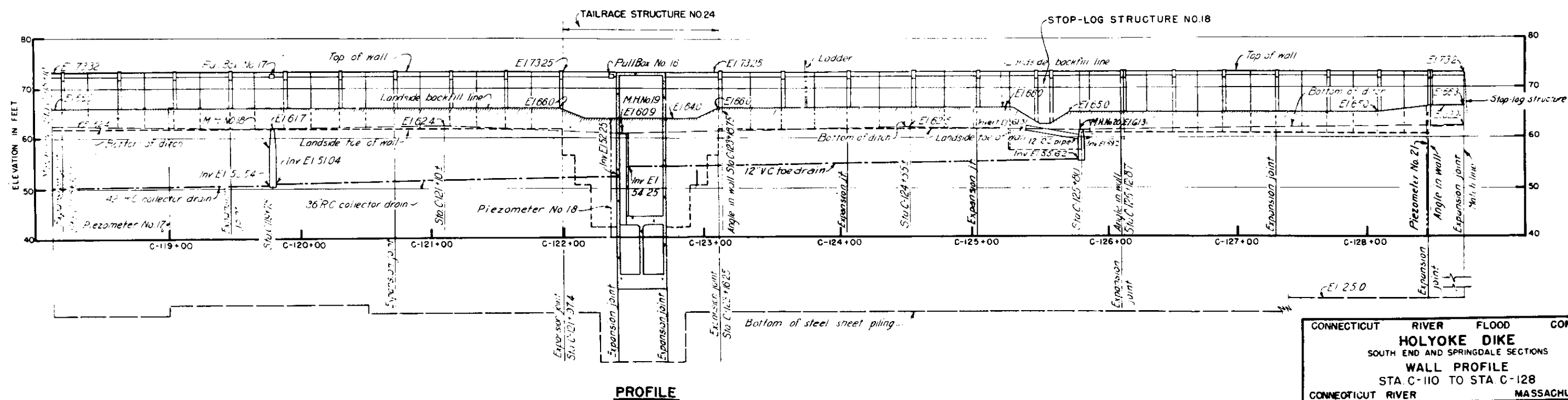
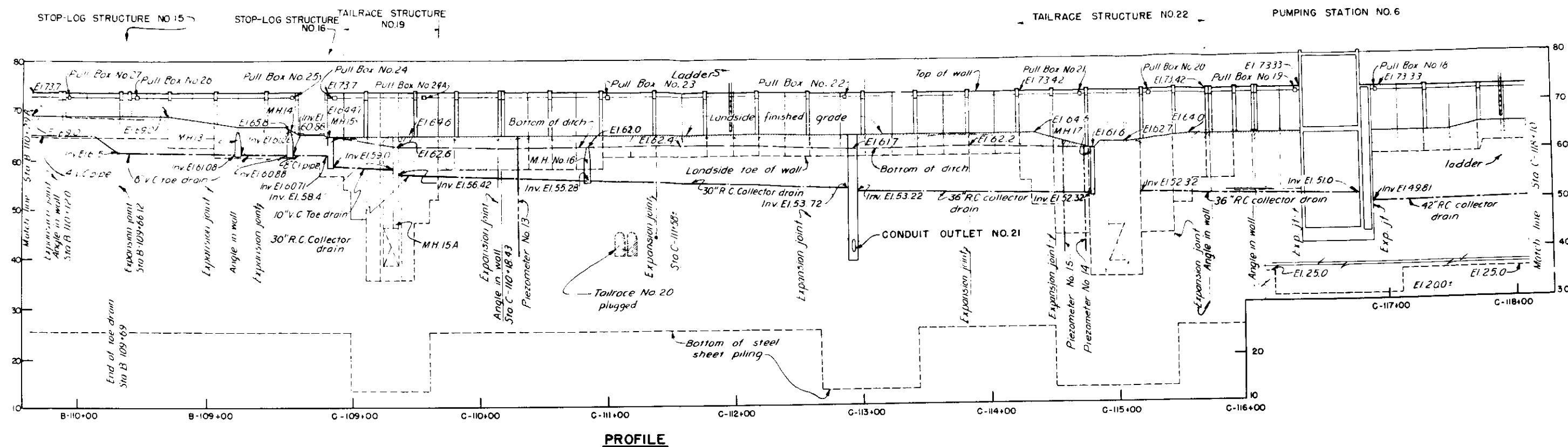
SECTION F₁₅ STA. 29+60

FROM STA. C+155.8 TO STA. 29+75.4 SIMILAR

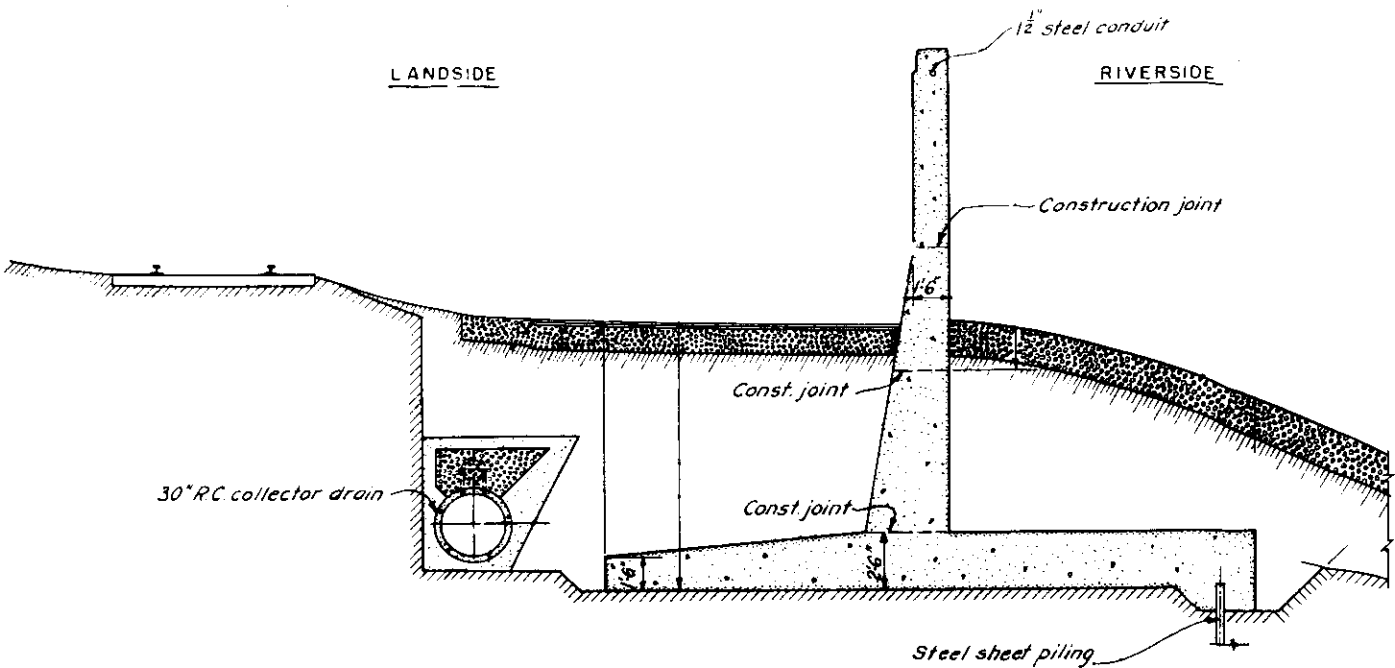
CONNECTICUT RIVER FLOOD CONTROL
HOLYOKE DIKE
PROFILES & TYPICAL SECTIONS
CONNECTICUT RIVER MASSACHUSETTS
FLOOD EMERGENCY MOBILIZATION PLAN
PREPARED BY
CORPS OF ENGINEERS, U.S. ARMY
OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION, BOSTON, MASS.



CONNECTICUT RIVER FLOOD CONTROL	
HOLYOKE DIKE	
SOUTH END AND SPRINGDALE SECTIONS	
WALL PROFILE	
STA. A-91 TO STA. A-109	
CONNECTICUT RIVER	MASSACHUSETTS
SCALE 1"=40 FT.	
NEW ENGLAND DIVISION, BOSTON, MASS.	
FLOOD EMERGENCY MOBILIZATION PLAN	

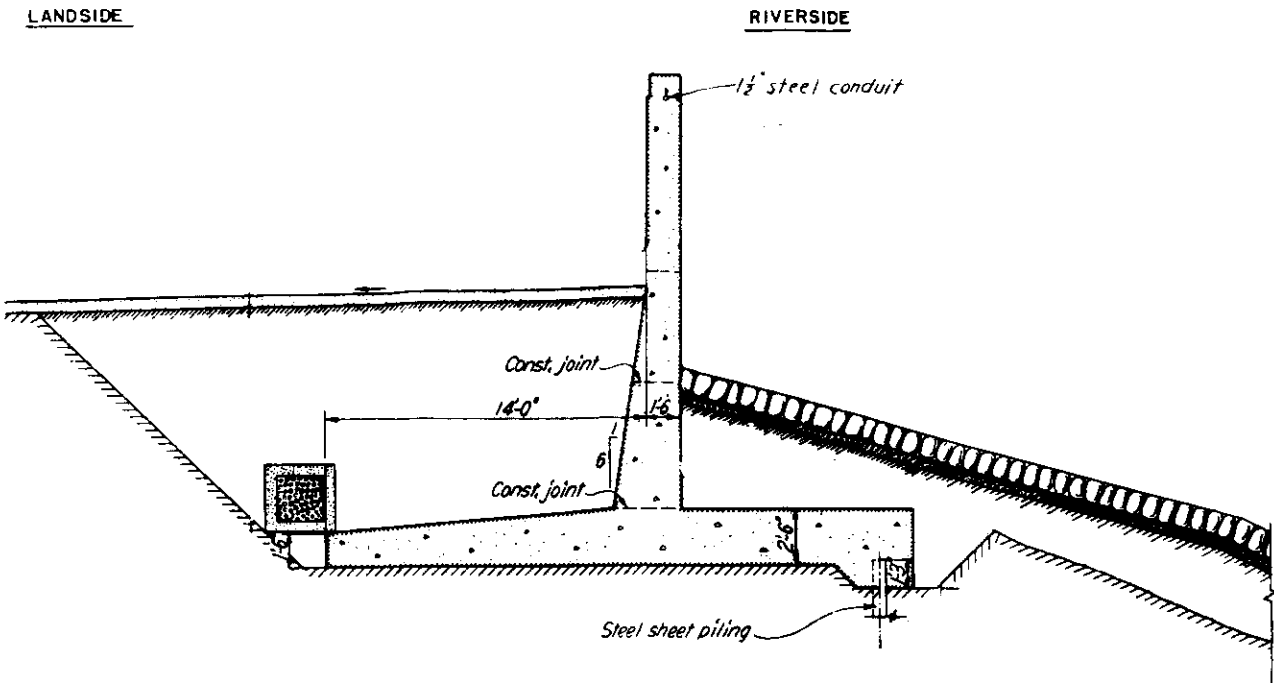


CONNECTICUT RIVER FLOOD CONTROL
HOLYOKE DIKE
 SOUTH END AND SPRINGDALE SECTIONS
WALL PROFILE
 STA. C-110 TO STA. C-128
 CONNECTICUT RIVER MASSACHUSETTS
 SCALE 1 IN = 40 FT
 NEW ENGLAND DIVISION, BOSTON, MASS
FLOOD EMERGENCY MOBILIZATION PLAN



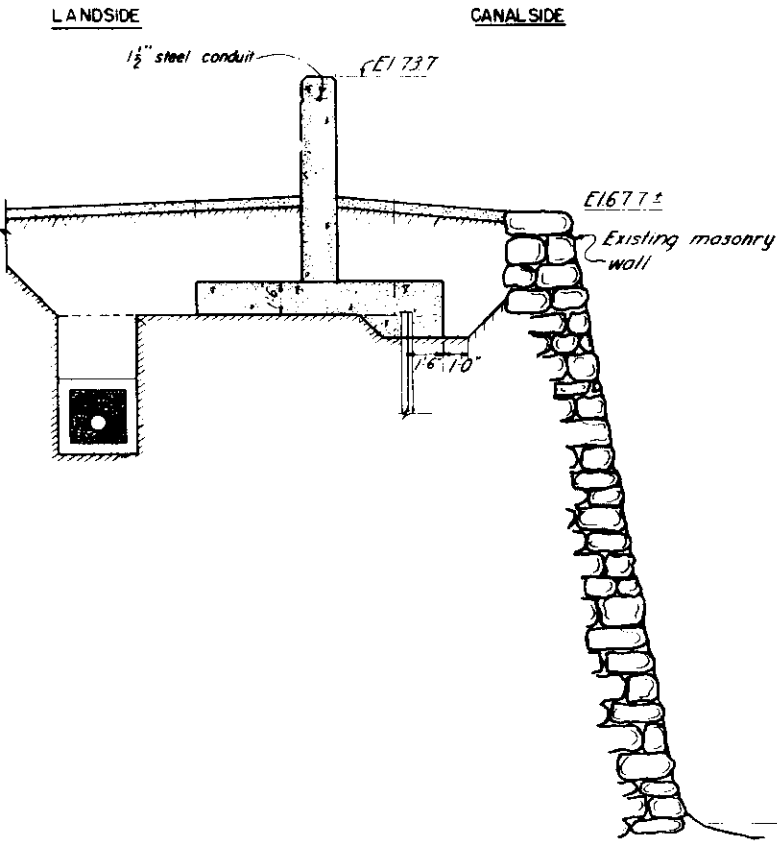
SECTION AT STA. A-102+50±

WALL SIMILAR BETWEEN PUMPING STATION NO.5 AND STA. A-102+64±



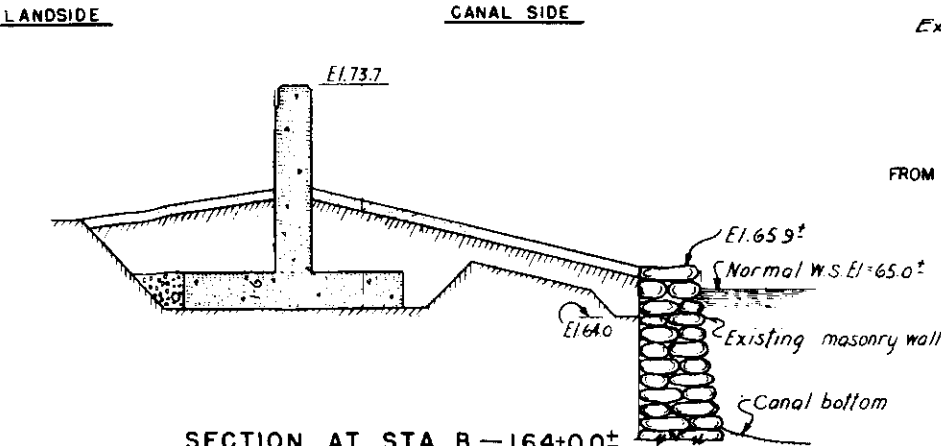
SECTION AT STA. C-115+90±

TYPICAL BETWEEN STA. C-115+86± AND STA. C-116+02± (ANGLE POINT)



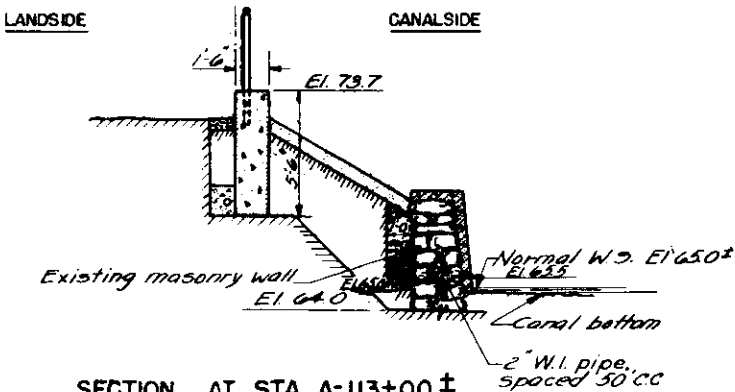
SECTION AT STA. A-106+90±

FROM STA. A-106+82± TO STA. A-107+02± SIMILAR



SECTION AT STA. B-164+00±

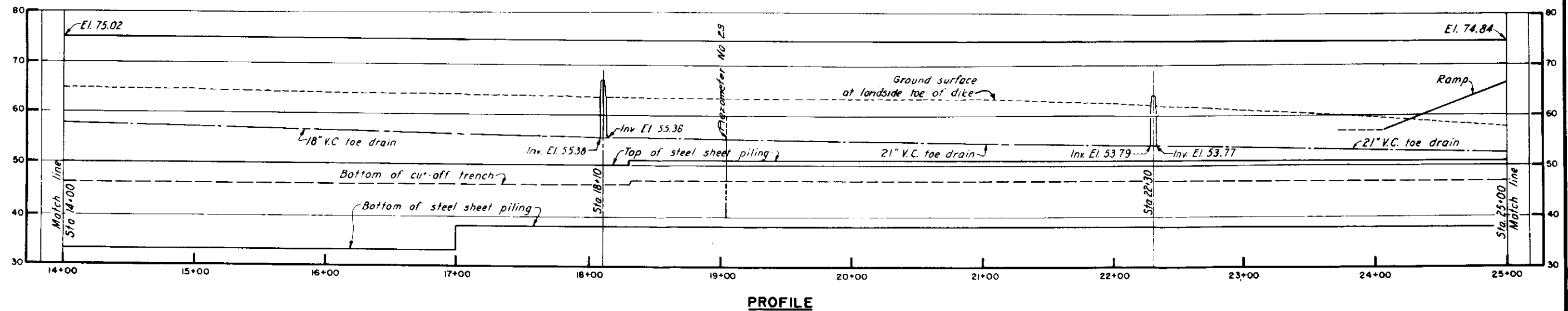
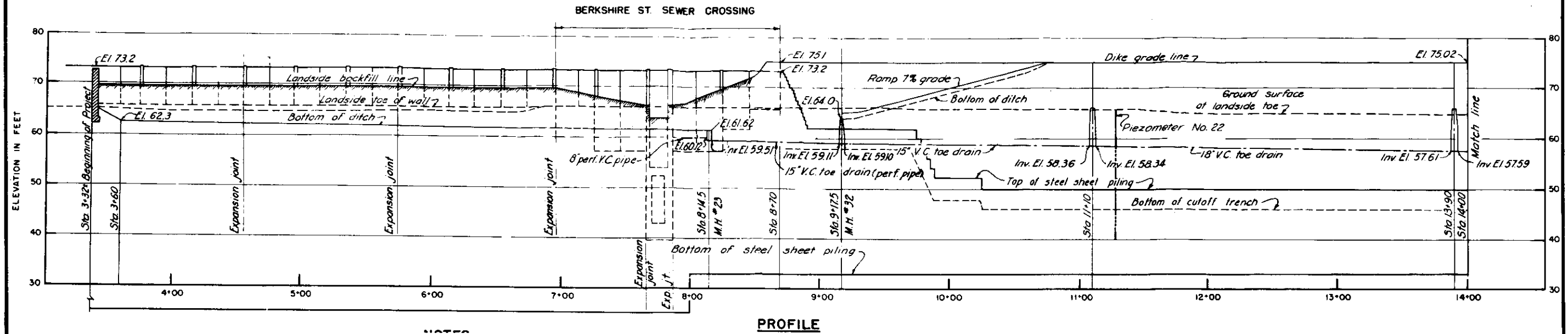
FROM STA. B-163+54± TO STA. B-165+04± SIMILAR



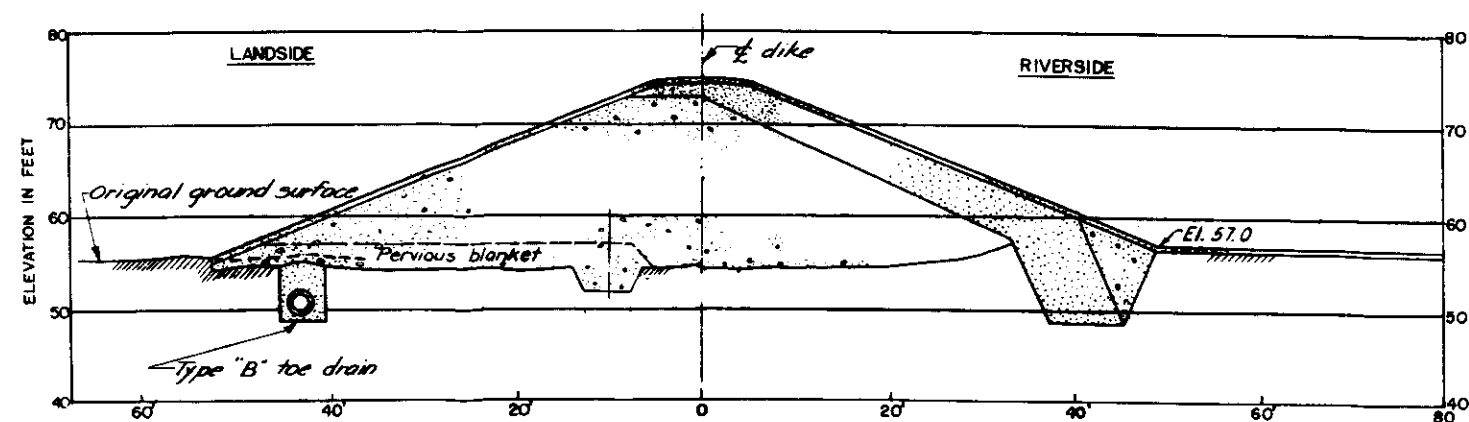
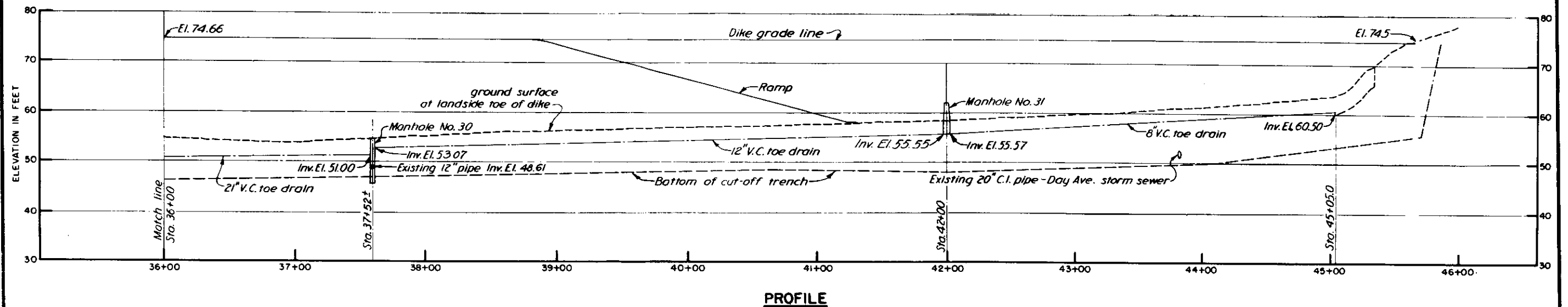
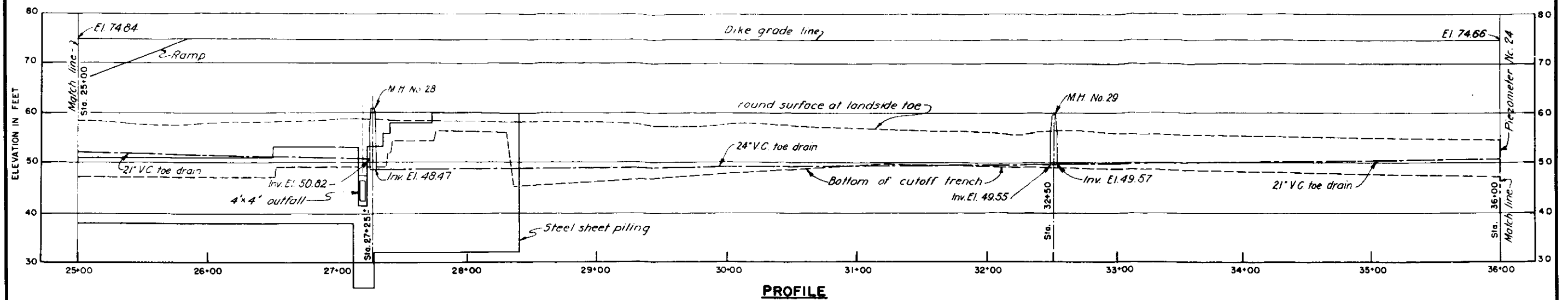
SECTION AT STA. A-113+00±

FROM STA. A-112+85± TO STA. A-113+26± SIMILAR

CONNECTICUT	RIVER	FLOOD	CONTROL
HOLYOKE DIKE			
SOUTH END AND SPRINGDALE SECTIONS			
TYPICAL SECTIONS			
CONNECTICUT RIVER			MASSACHUSETTS
SCALE 1/4" = 40 FT.			
NEW ENGLAND DIVISION, BOSTON, MASS.			
FLOOD EMERGENCY MOBILIZATION PLAN			

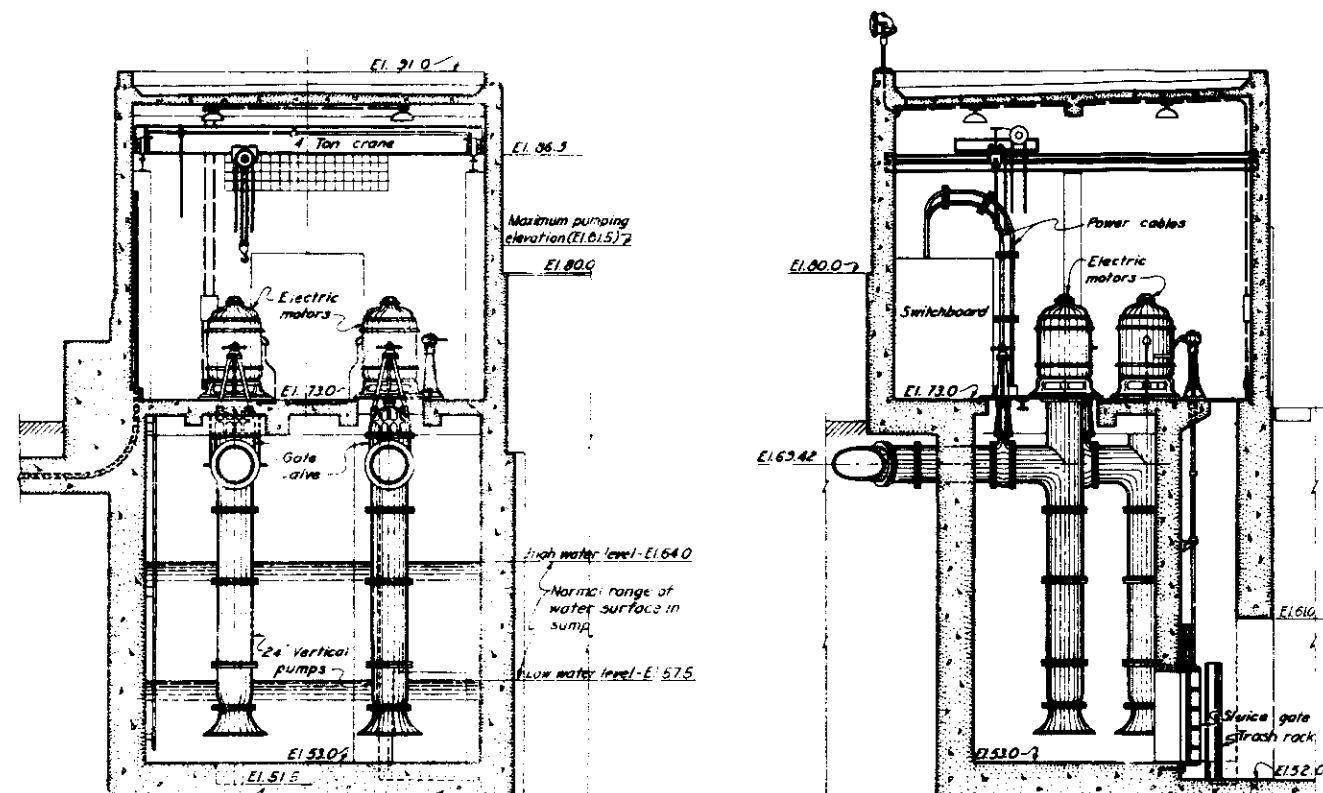


CONNECTICUT RIVER FLOOD CONTROL
HOLYOKE DIKE
 SOUTH END AND SPRINGDALE SECTIONS
DIKE PROFILE
 STA. 3+60 TO STA. 25
 CONNECTICUT RIVER MASSACHUSETTS
 SCALE 1 IN. = 40 FT.
 NEW ENGLAND DIVISION, BOSTON, MASS.
 FLOOD EMERGENCY MOBILIZATION PLAN

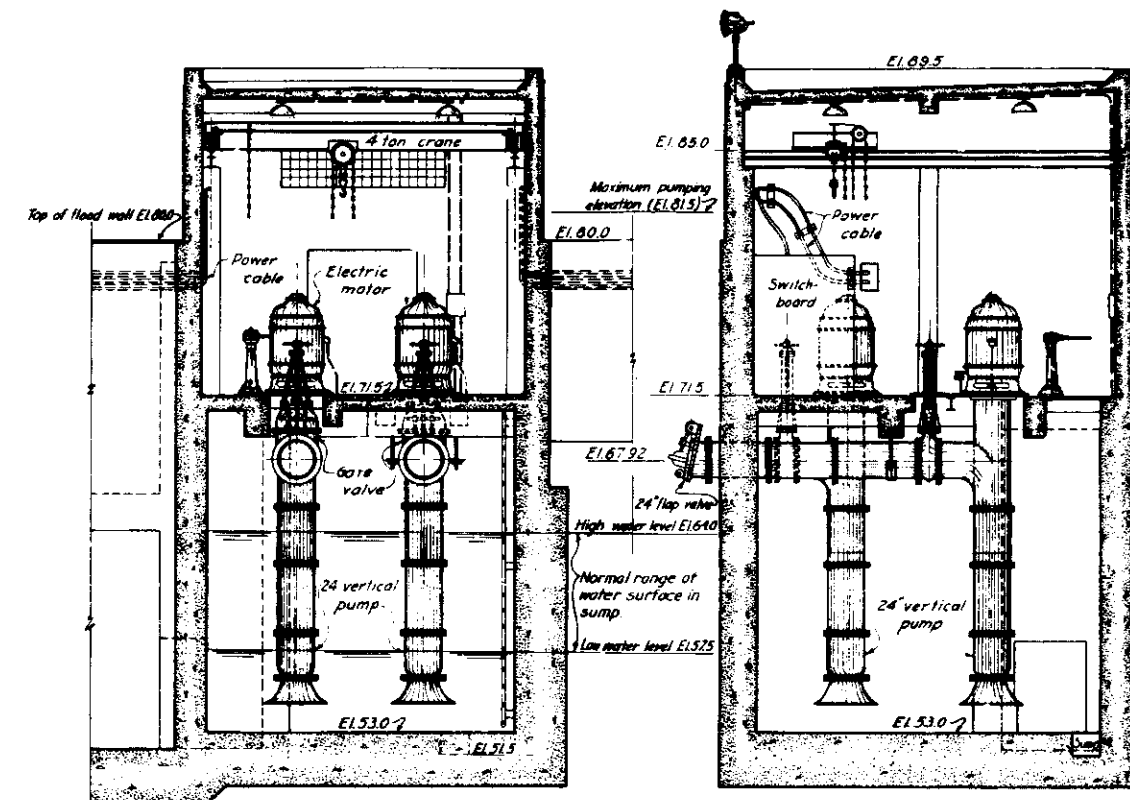


SECTION AT STA. 33+00
SCALE 1" = 10' - 0"
(TYPICAL FROM STA. 29+75± TO STA. 34+50±)

CONNECTICUT RIVER FLOOD CONTROL
HOLYOKE DIKE
SOUTH END AND SPRINGDALE SECTIONS
DIKE PROFILE
STA. 25 TO STA. 45
CONNECTICUT RIVER MASSACHUSETTS
SCALE 1 IN. = 40 FT
NEW ENGLAND DIVISION, BOSTON, MASS.
FLOOD EMERGENCY MOBILIZATION PLAN



PUMPING STATION NO. 1



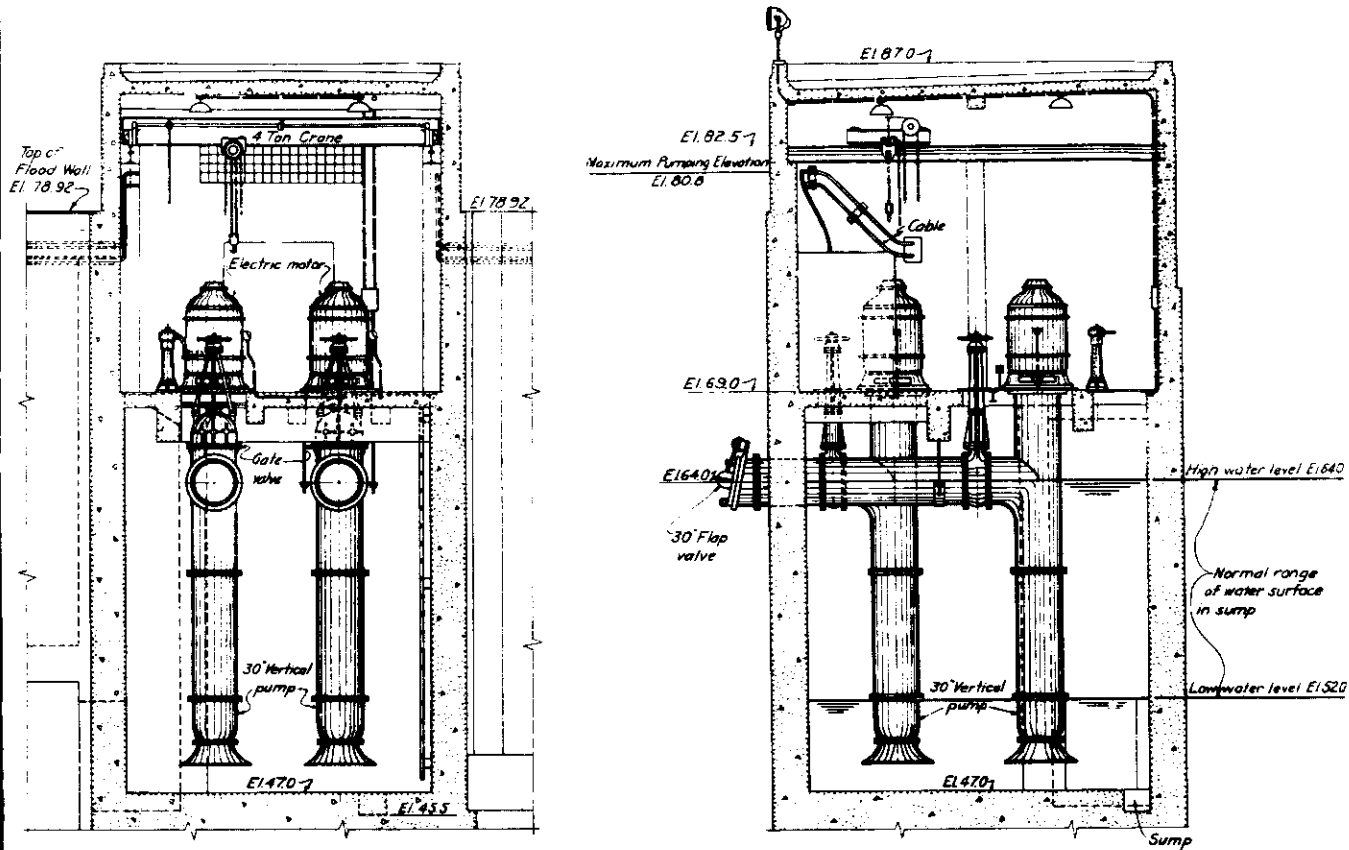
PUMPING STATION NO. 2

CONNECTICUT RIVER FLOOD CONTROL HOLYOKE DIKE PUMPING STATION EQUIPMENT

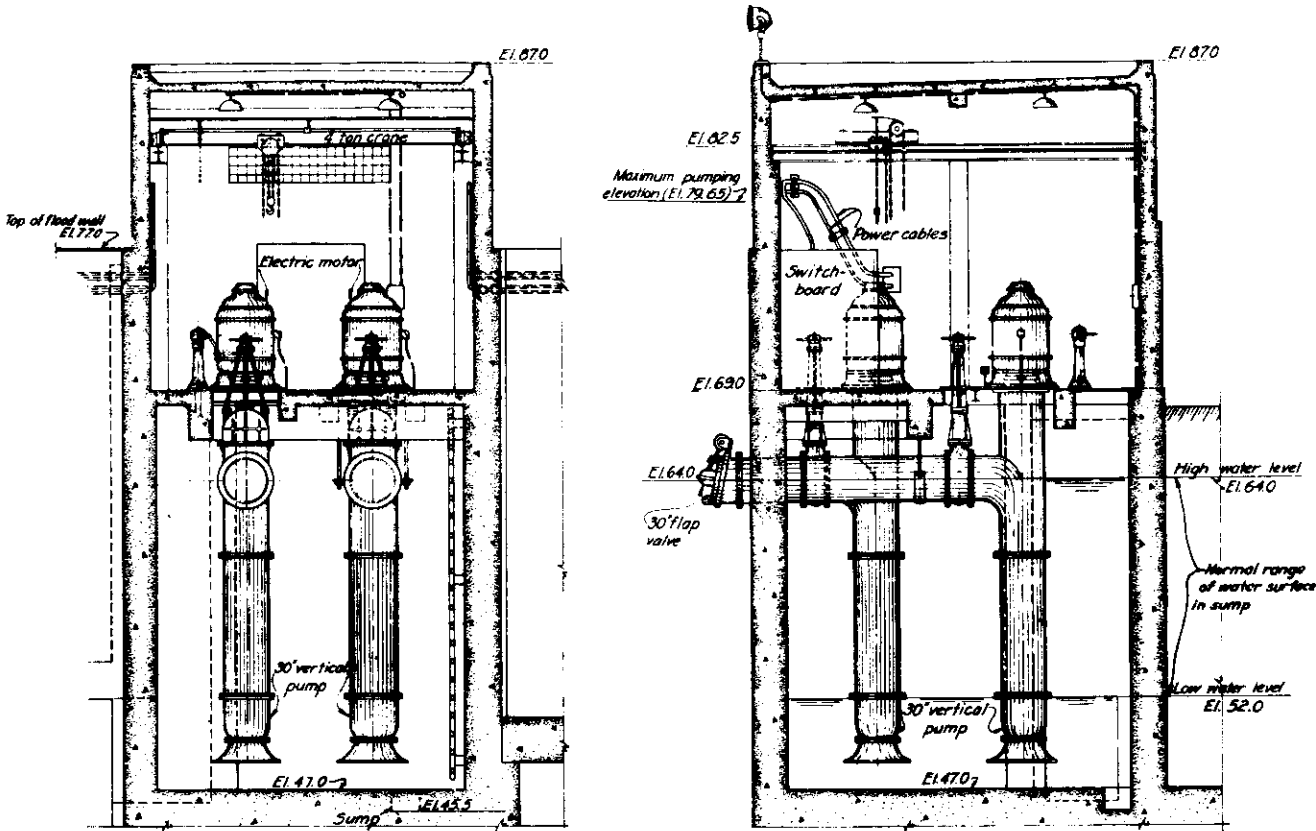
CONNECTICUT RIVER	MASSACHUSETTS
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FLOOD EMERGENCY MOBILIZATION PLAN

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OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION, BOSTON, MASS.

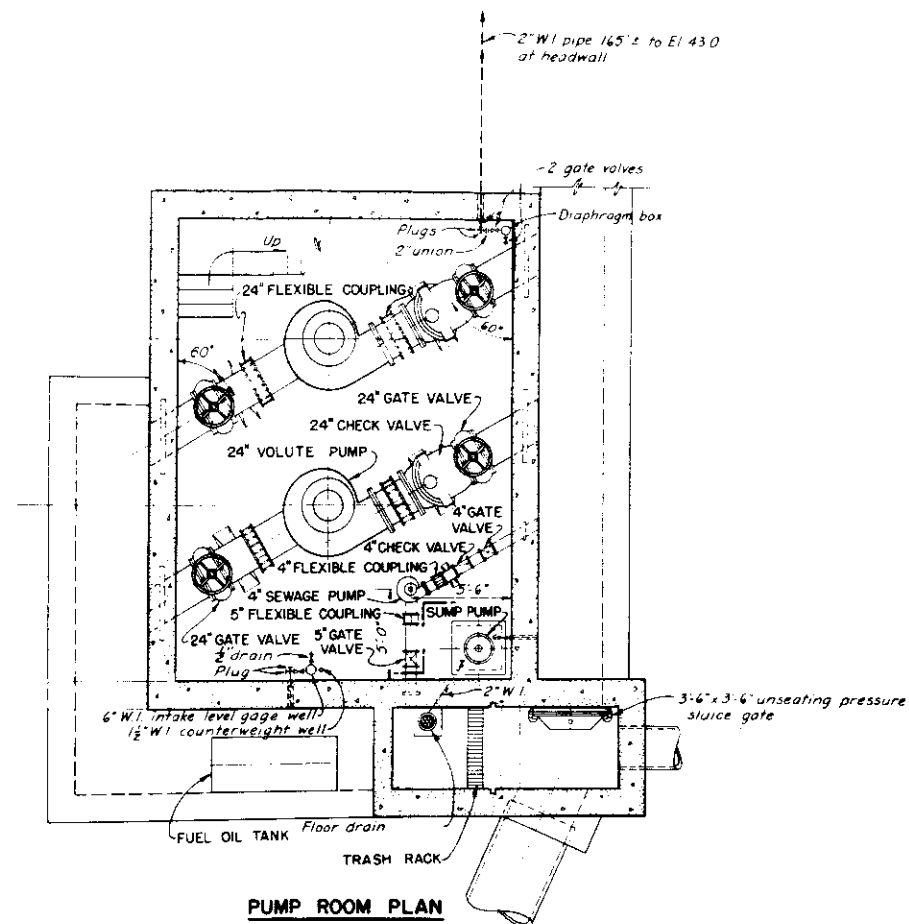


PUMPING STATION NO. 3

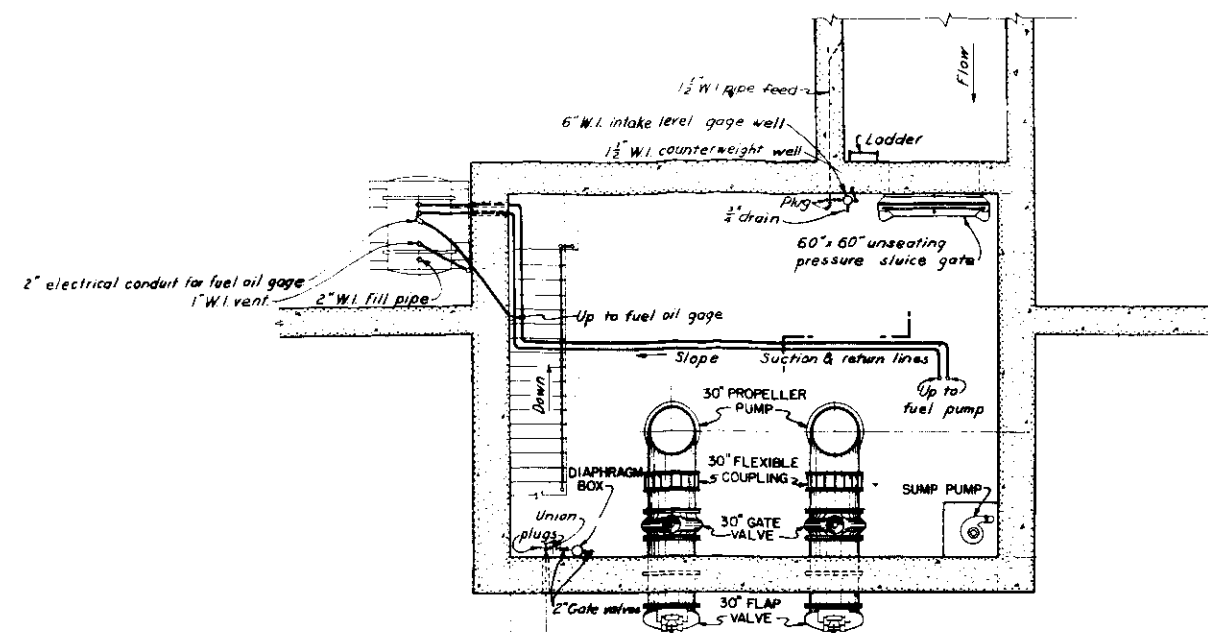
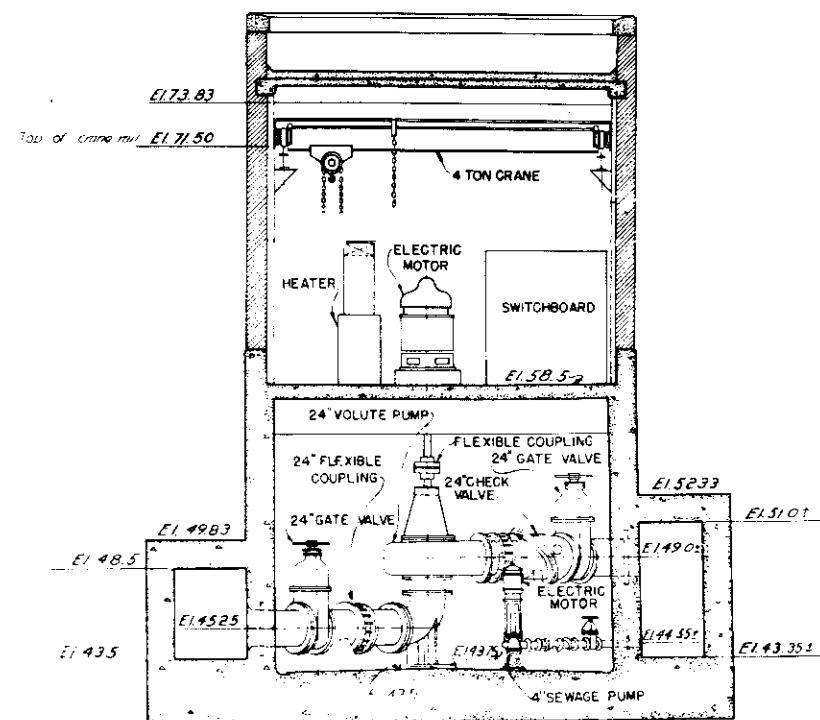


PUMPING STATION NO. 4

CONNECTICUT RIVER FLOOD CONTROL
HOLYOKE DIKE
PUMPING STATION EQUIPMENT
CONNECTICUT RIVER MASSACHUSETTS
FLOOD EMERGENCY MOBILIZATION PLAN
PREPARED BY
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OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION, BOSTON, MASS.

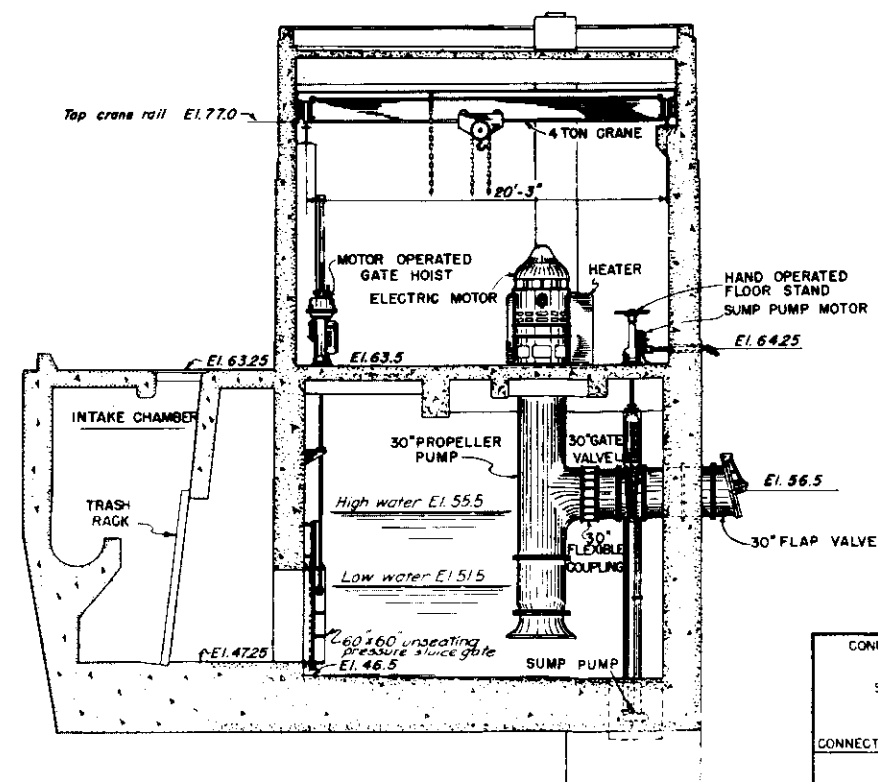


SPRINGDALE PUMPING STATION

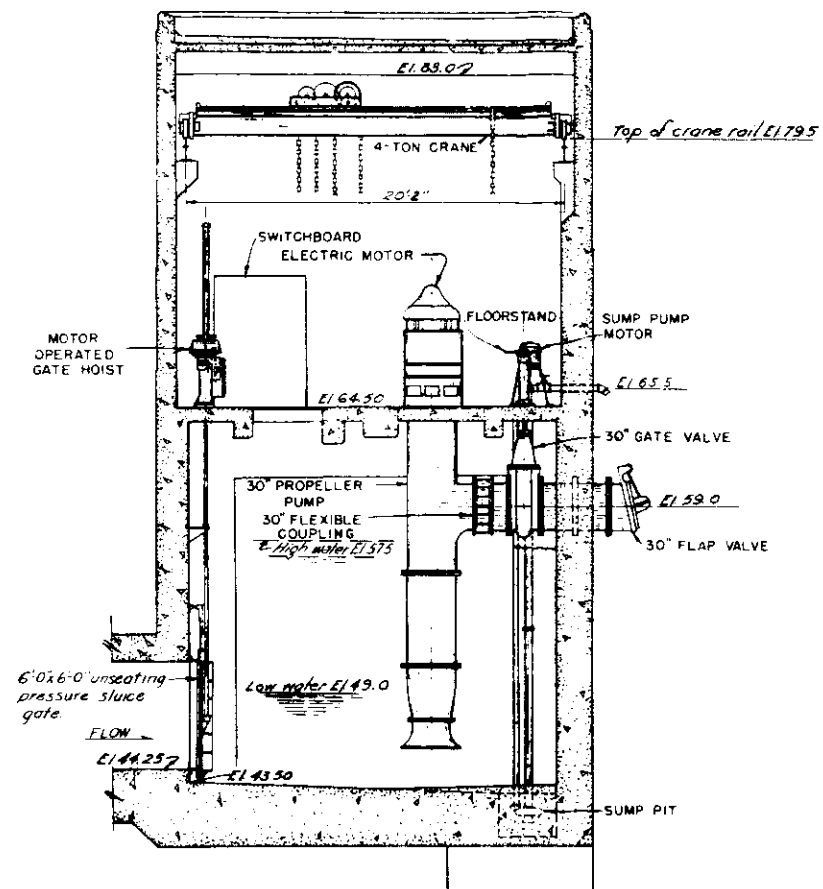


PUMP ROOM PLAN

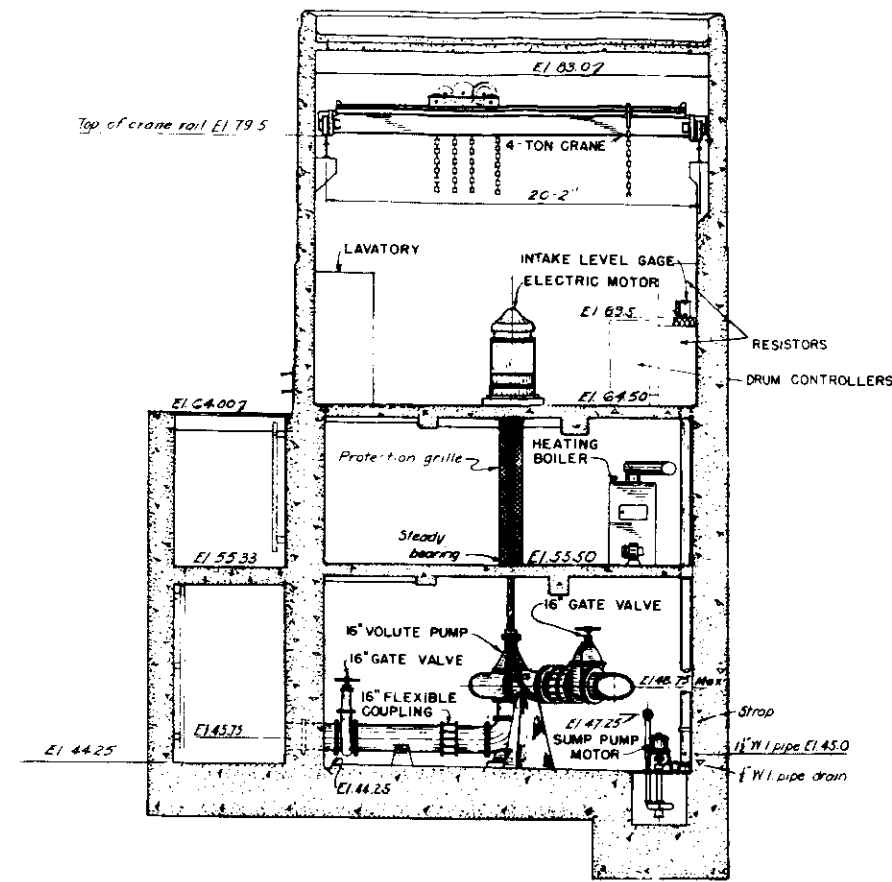
PUMPING STATION NO. 5



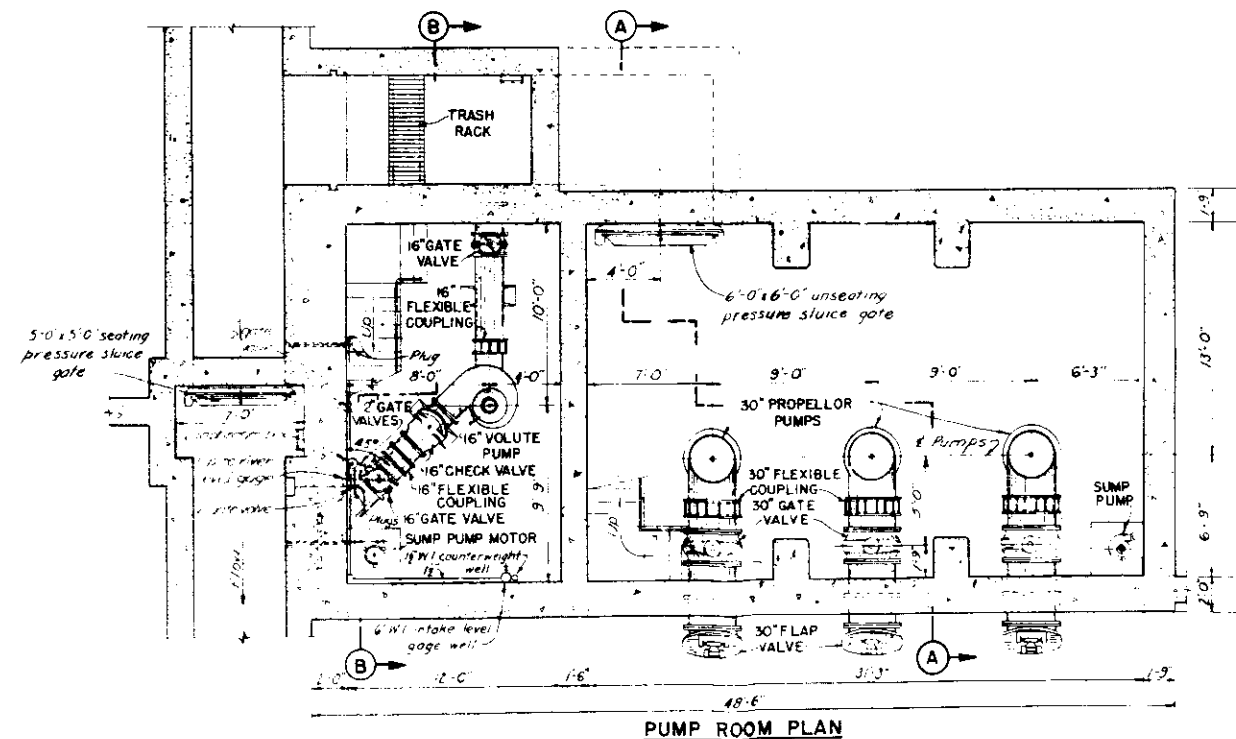
CONNECTICUT RIVER FLOOD CONTROL
HOLYOKE DIKE
SOUTH END AND SPRINGDALE SECTIONS
SPRINGDALE PUMPING STATION
PUMPING STATION NO. 5
CONNECTICUT RIVER MASSACHUSETTS
SCALE 1 IN = 40 FT
NEW ENGLAND DIVISION, BOSTON, MASS
FLOOD EMERGENCY MOBILIZATION PLAN



SECTION A-A



SECTION B-B



PUMP ROOM PLAN

CONNECTICUT RIVER FLOOD CONTROL	
HOLYOKE DIKE	
SOUTH END AND SPRINGDALE SECTIONS	
PUMPING STATION NO. 6	
CONNECTICUT RIVER	MASSACHUSETTS
SCALE 1/4\"/>	
FLOOD EMERGENCY MOBILIZATION PLAN	
PREPARED BY	
CORPS OF ENGINEERS, U.S. ARMY	
OFFICE OF THE DIVISION ENGINEER	
NEW ENGLAND DIVISION, BOSTON, MASS.	

NORTHAMPTON, MASSACHUSETTS

The flood protection system for Northampton consists of two main parts: an earth dike in the eastern part of the City affording protection against high water from the Connecticut River, and an earth dike and concrete flood wall in the western part of the City which, together with the Mill River diversion canal, affords protection against flash floods on the Mill River and backwater from the Connecticut River via the Ox Bow Lake. Failure of either section substantially nullifies protection afforded by the other.

The elements of the eastern flood works are:

- 5,000 linear feet of earth dike
 - 1 pumping station with storage pond
 - 2 stop-log structures
 - 1 gated drainage structure

The flood works in the western part of the City consist of:

- 450 linear feet of concrete flood wall
- 2,000 linear feet of earth dike
 - 1 stop-log structure
 - 1 sandbag opening
 - 2 drainage structures
 - 3 miles of diversion canal

The method and sequence of operations in prosecuting a flood fight is set forth in detail in the Operation and Maintenance Manual for Flood Protection System, Northampton, Massachusetts, issued by this office and furnished to the City.

The principal features of operation are the closure of 24" gated sewer opening through dike near Pomeroy Terrace, closure of gate in the Proper McCallum Hosiery Company outlet, closure of stop-log openings and start of pumping, at critical elevations, as shown on attached chart. At river stage of 132 or higher it may be necessary to pump surface drainage over the stop-log on West Street from a catch basin located at the curb near the Northampton Electric Light and Power Company. A portable centrifugal pump is provided by the City for this purpose.

February 1951

FLOOD FREQUENCIES DURING MARCH - JUNE

<u>Frequency</u>	<u>Elev. M.S.L.*</u>
Annual	114.2
2 years	116.6
5 years	119.2
10 years	121.3
20 years	123.5
50 years	126.9

Note: Stages at Northampton are located in backwater effect and may vary one to two feet.

* At the Calvin Coolidge Bridge

PREVIOUS HIGH WATER ELEVATIONS

	<u>Stage over Holyoke Dam</u>	<u>Elevation (M.S.L.) at Northampton Pumping Station</u>
Nov. 1927	14.75	121.3
Mar. 1936	16.8	129.3
Sep. 1938	14.9	125.0
Mar. 1948	11.4	117.7
Dec. 1949	11.6	118.8

ESTIMATED SANDBAG REQUIREMENTS

Stop-logs and sandbag closure	2,000
Sand boils and sloughs	1,000
Raising wall one (1) foot	2,000
Raising dike one (1) foot	20,000
TOTAL	25,000

Recommended stock level for storage - 2,000 to 4,000
On hand 10 January 1954 - 700
Available - 4000

February 1954

Northampton
Exchange

Mayor: James Cahillane:
City Hall 1150
(Res.) 381 South Street 4499

Superintendent of Maintenance and Operation
of Flood Protection System: Francis P. Ryan, City Engineer
City Hall 2025-R
(Res.) 12 Summer Avenue 381-J

Superintendent of Streets: Wallace A. Howes
City Hall 2025-W
(Res.) 82 North Maple St. 1118
Florence, Mass.

Supervisor of Pumping Station: O. E. Brainard
Supt. of Sewer Dept.
City Hall 3503
(Res.) West Street
W. Hatfield Enterprise 6567

Pumping Station Operator: John Sankey
(Res.) North King Street 1113

Northampton Pumping Station: Hockanum Road 3509

Red Cross Headquarters: Memorial Hall 787

State Police: Troop B, Greenfield Road 3000

February 1954

NORTHAMPTON, MASSACHUSETTS

Critical Elevations

120.62 7 feet M.S.L. Bench Mark.

Standard U.S.C. & G.S. Disk #9xLCS set in concrete post flush with ground. 134 feet north of B. & M. RR signal tower, 167 feet south of Hockanum Road and 7 feet east of east rail.

(1) Connecticut River

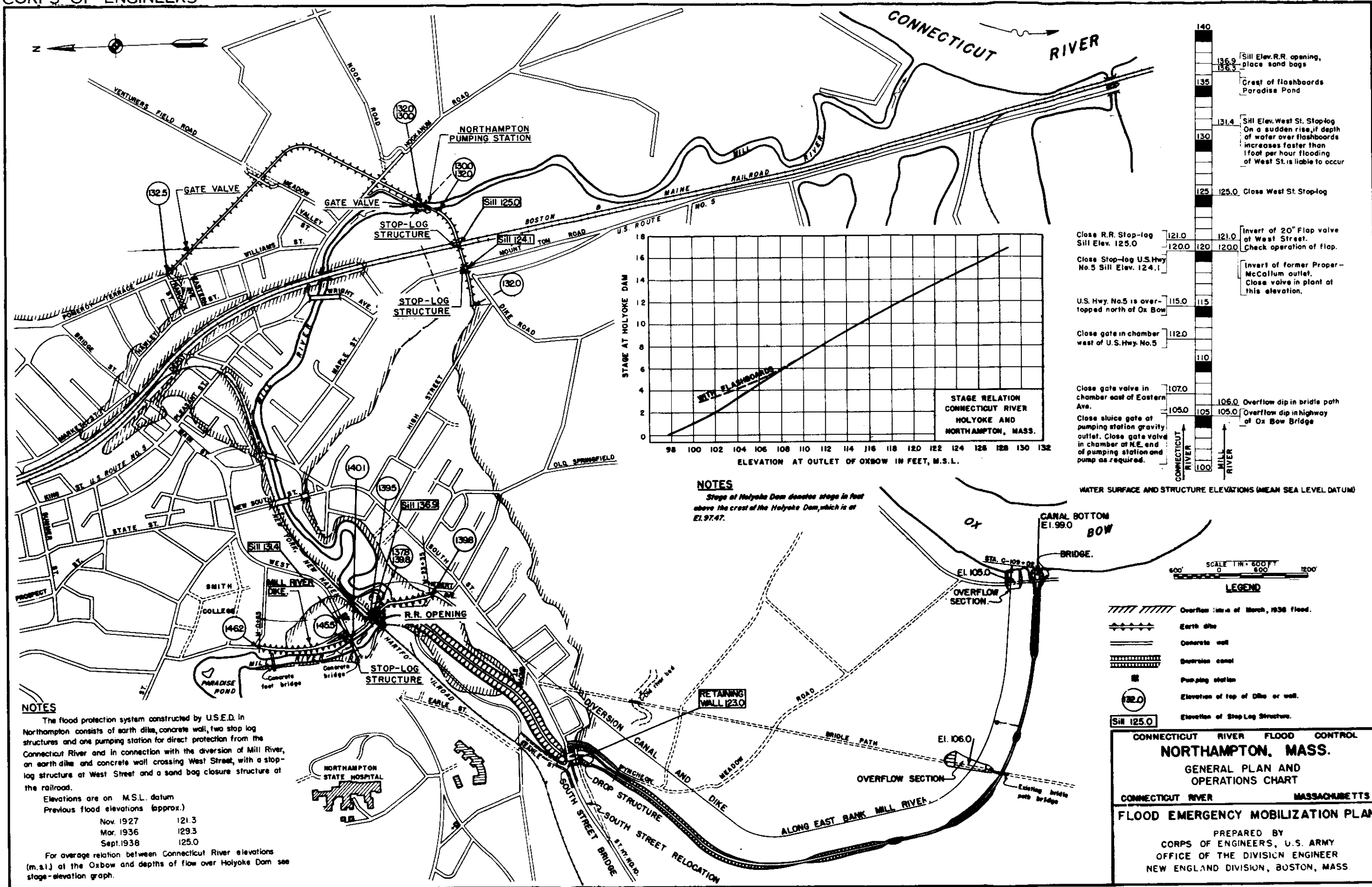
98 Approximate low water
105 Close gate at pump station gravity outlet and gate valve in chamber at northeast end of pumping station and start pumping out pond.
107 Close gate valve in chamber east of Eastern Avenue
112 Close gate in chamber, U. S. Highway No. 5
115 U. S. Highway No. 5 is overtopped, north of Ox Bow
124.1 Sill of stop-log structure U. S. Highway No. 5
125.0 Sill of railroad stop-log structure, B. & M. Railroad
130.0 Top of concrete flood walls
132.0 Top of earth dike

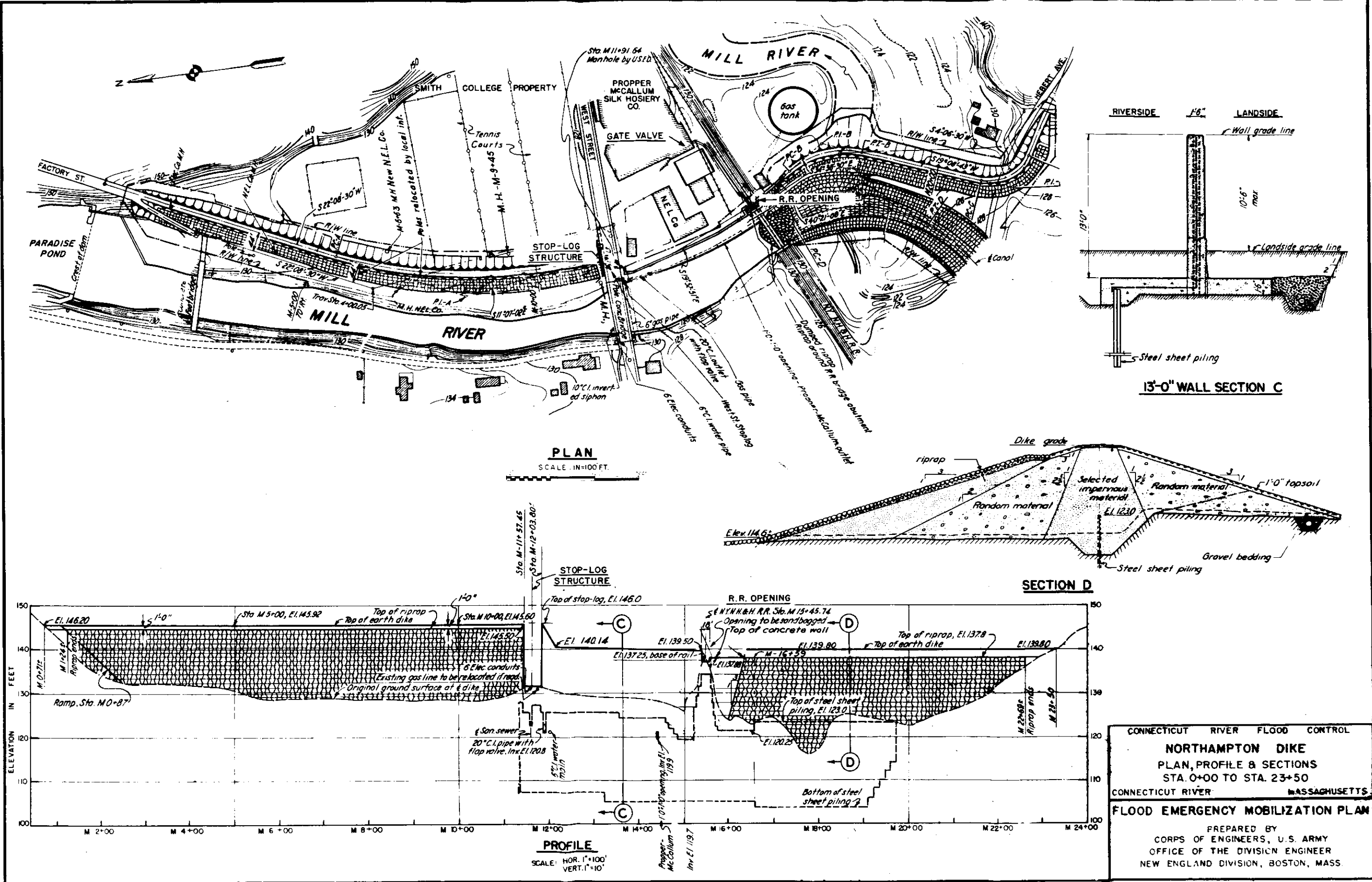
(2) Mill River

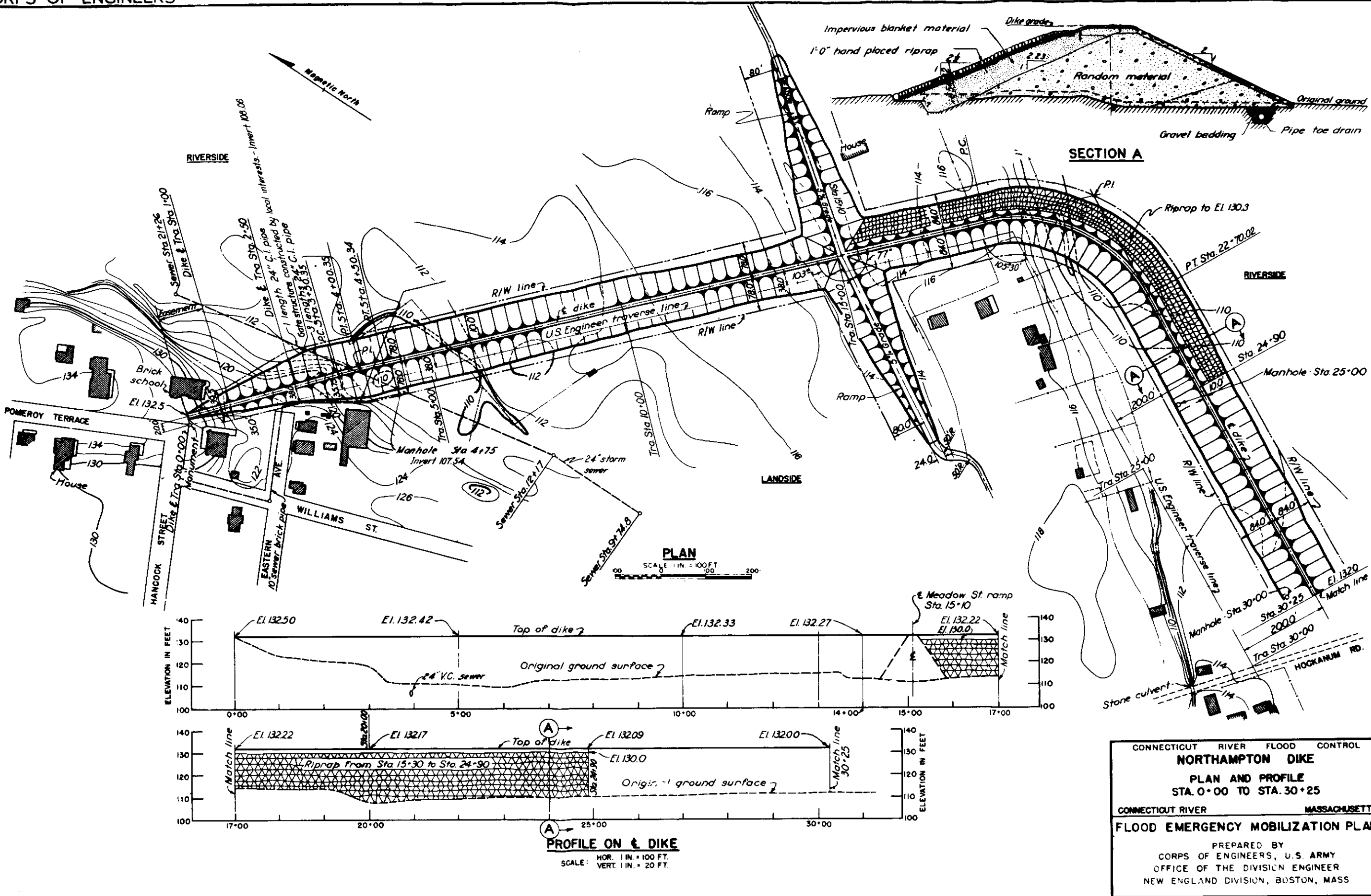
99.0 Bottom diversion canal at Ox Bow Bridge
100 Approximately low water in Ox Bow
105 Overflow dip in highway at Ox Bow Bridge
106 Floor of Ox Bow Bridge
106 Overflow dip in Bridle Path
114.5 Crest of weir under South Street Bridge
116 Approximate low water at West Street
120 Invert of Proper McCallum Outlet; close valve in this line
121 Invert 20" flap valve at West Street
131.4 Sill of West Street stop-log structure
136.3 Crest of flashboards Paradise Pond Dam. On a sudden rise if depth of water over flashboards increases faster than 1 foot per hour, flooding of West Street is liable to occur.
136.9 Sill of railroad opening, N.Y. N.H. & H. Railroad
137.8 Top of concrete flood wall, N.Y. N.H. & H. Railroad
140.1 Top of concrete flood wall below West Street
145.5 Top of earth dike above West Street

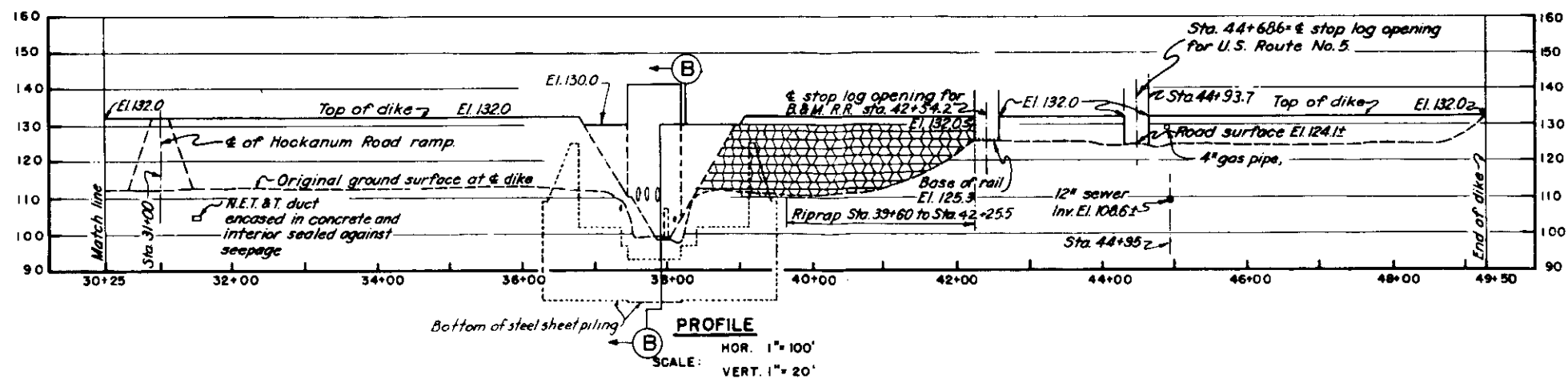
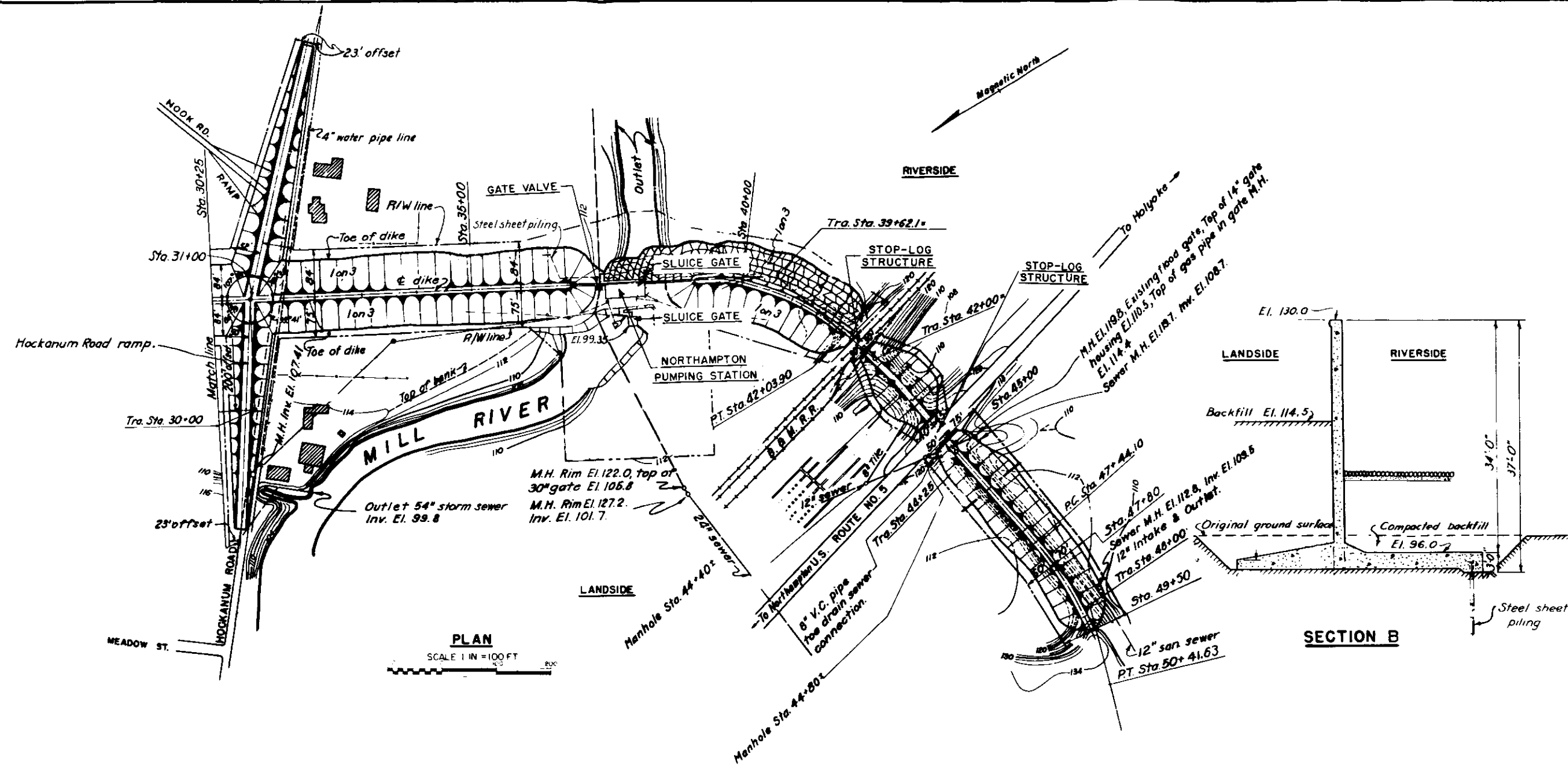
Note: At elevations higher than 110 there is very little difference in elevation of water at Ox Bow and at pumping station.

February 1951

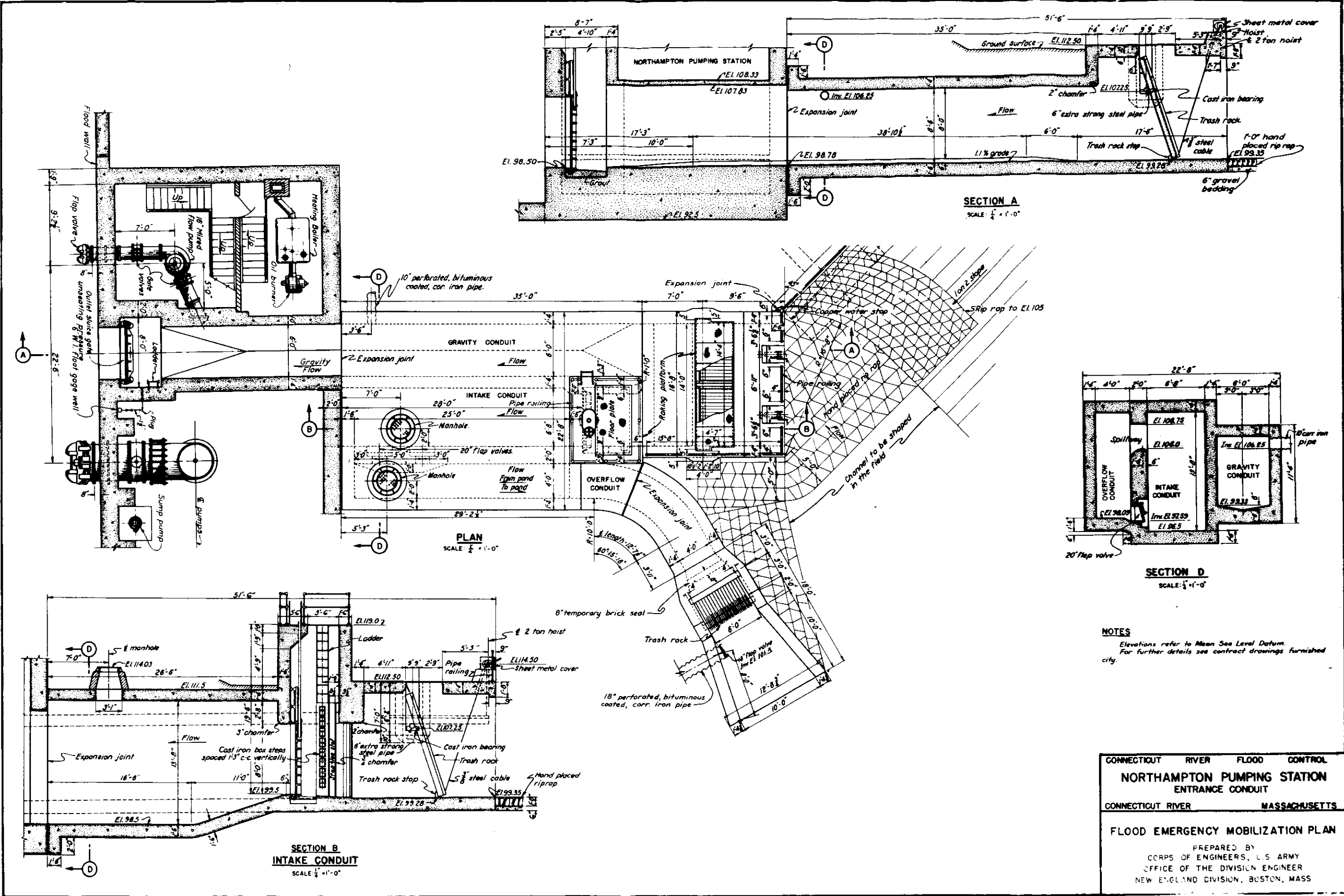


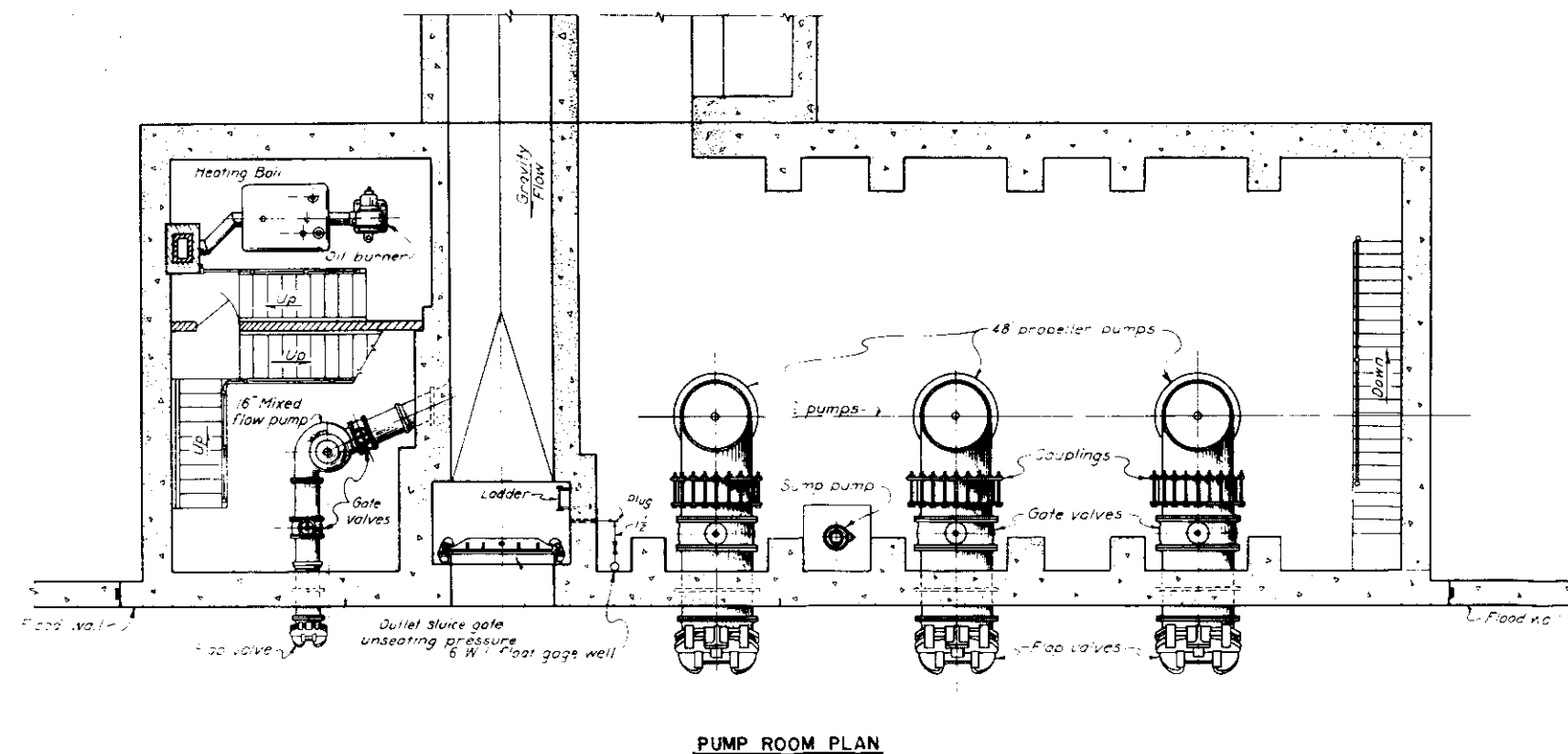
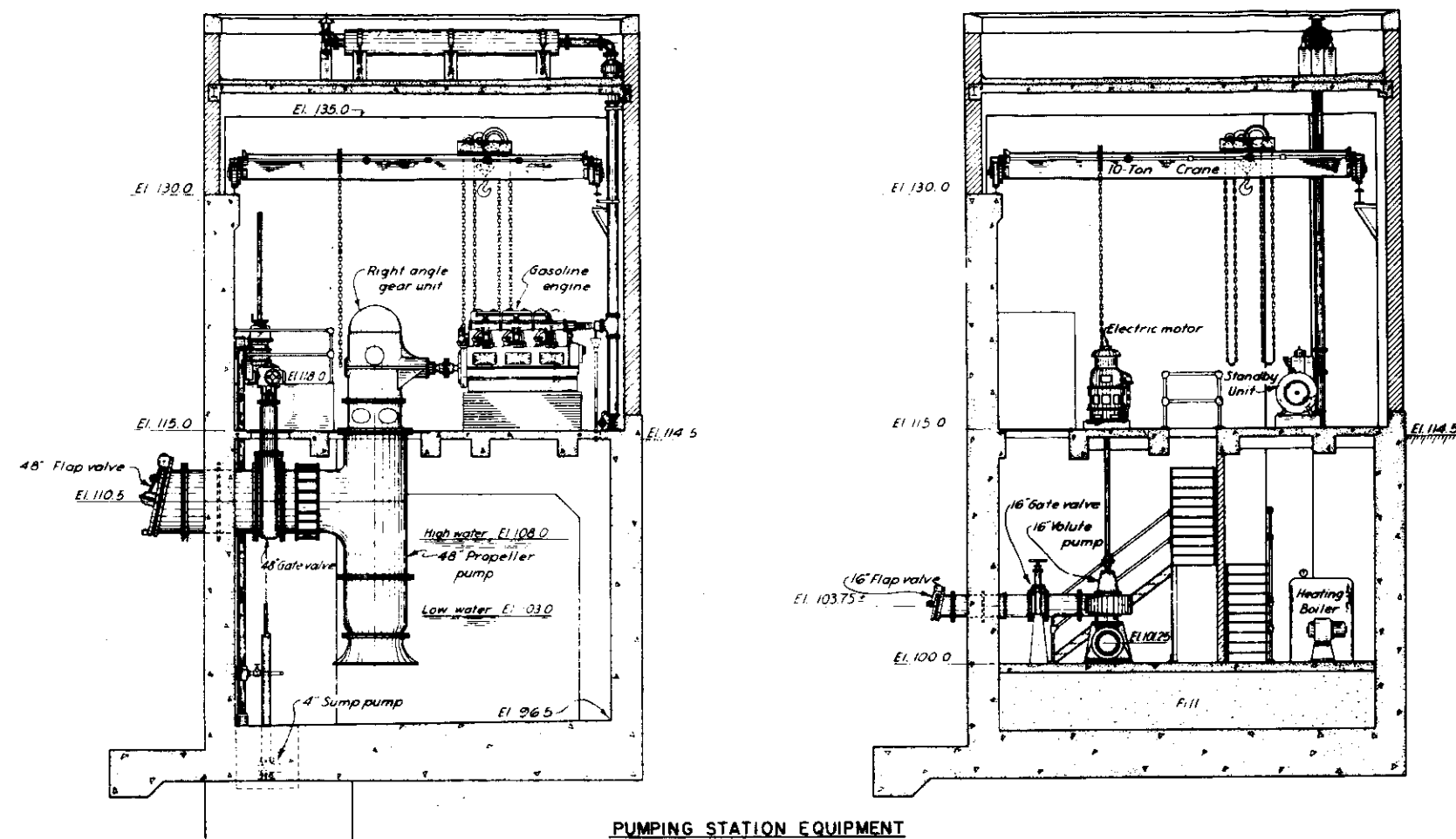






CONNECTICUT RIVER FLOOD CONTROL
NORTHAMPTON DIKE
PLAN, PROFILE & SECTION
STA. 30+25 TO STA. 49+50
CONNECTICUT RIVER MASSACHUSETTS
FLOOD EMERGENCY MOBILIZATION PLAN
PREPARED BY
CORPS OF ENGINEERS, U.S. ARMY
OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION, BOSTON, MASS





CONNECTICUT RIVER FLOOD CONTROL
NORTHAMPTON PUMPING STATION
 GENERAL ARRANGEMENT OF EQUIPMENT
 CONNECTICUT RIVER MASSACHUSETTS

FLOOD EMERGENCY MOBILIZATION PLAN

PREPARED BY
 CORPS OF ENGINEERS, U. S. ARMY
 OFFICE OF THE DIVISION ENGINEER
 NEW ENGLAND DIVISION, BOSTON, MASS.

HADLEY, MASSACHUSETTS

General Conditions

About 8500 feet of earth dike, as shown on Map on following page, are owned and maintained by the town. The dike is in relatively poor condition. Borrow areas are contiguous to the landside toe and the dike and its foundation contain a high percentage of pervious material which will allow considerable seepage.

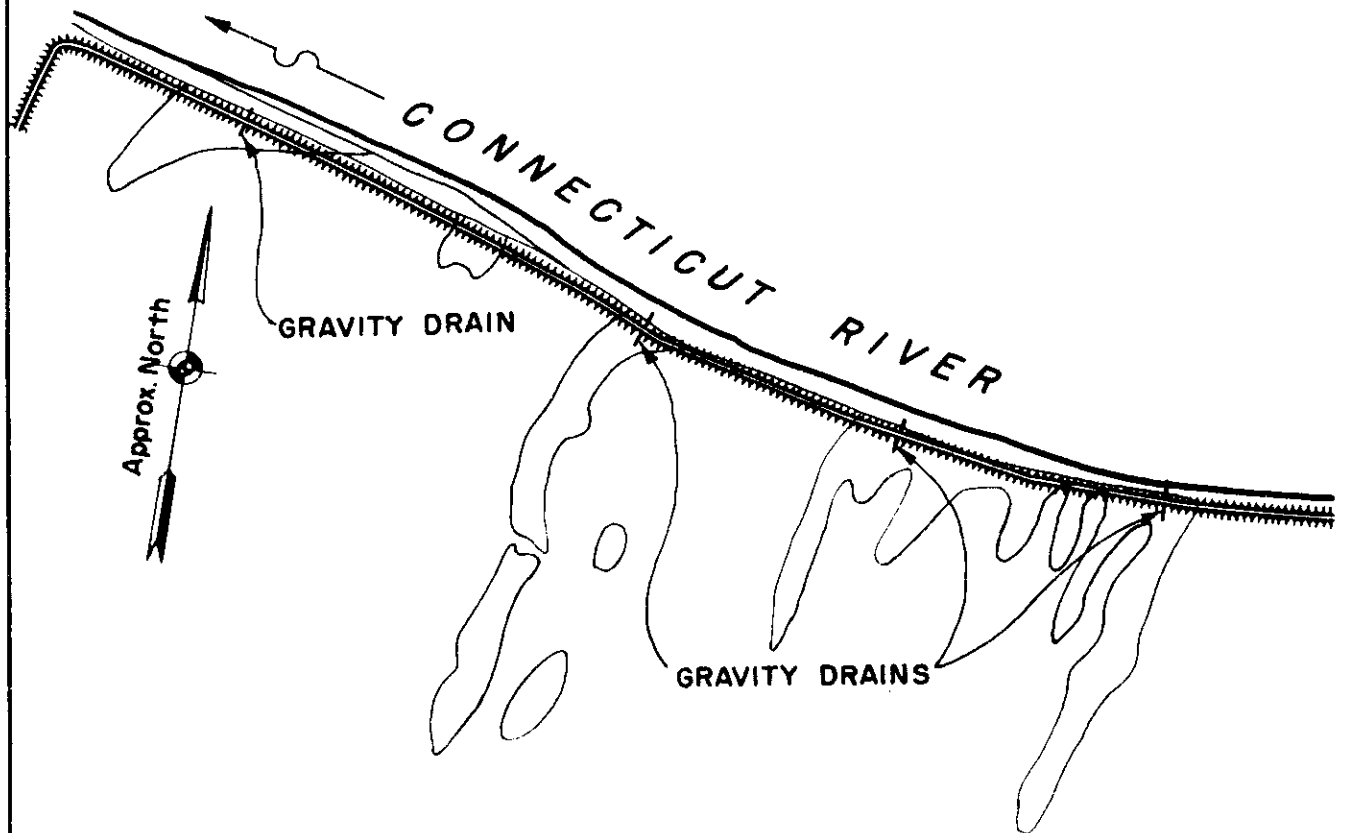
At point "A" on attached Map the dike broke in the 1936 flood. Effectiveness of repairs is doubtful, although the dike held in 1938 when portions of the dike were topped. Conditions with a flood reaching elevation 125 m.s.l. or higher are generally critical, occasioned principally by strong currents against inadequately protected riverside slopes near the upper end of the dike. At point "C" the riverside slope has been cut back by erosion until it is nearly vertical, indicative of an eventual breach at this point unless corrective measures are undertaken. Between points "C" and "B" little riprap was visible in March 1945.

The Boston & Maine Railroad embankment, paralleling and back of this dike, has an elevation of about 128 feet m.s.l. Effectiveness of the embankment as a "second line of defense" is also doubtful as it is built of highly pervious material, sand and cinders, and was breached in 1938. One opening, a 30-inch pipe, immediately south of the 1936 dike crevasse, would require plugging.

Flood maintenance measures at this town would probably be limited to the use of sandbags for "front facing" to retard seepage or prevent erosion, and to the care of gravity drains under the dike.

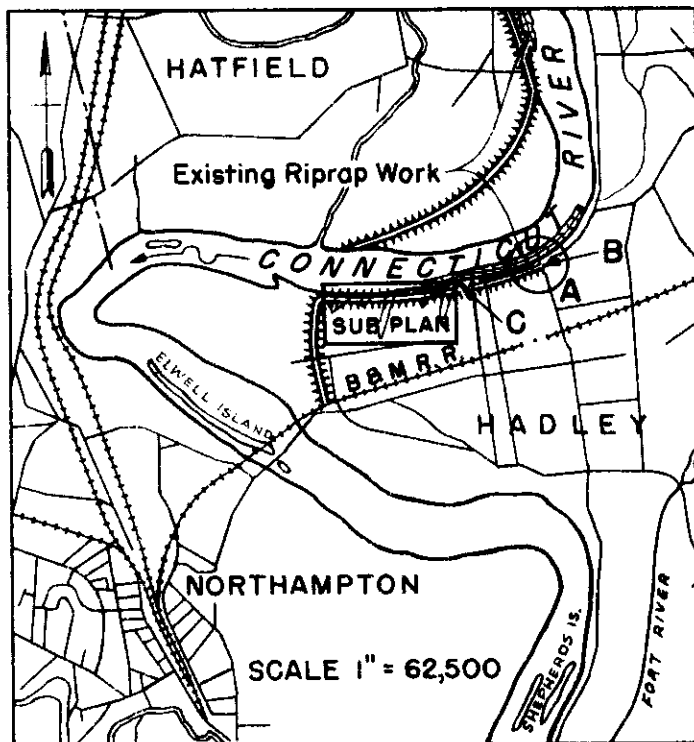
NOTE: The information on which this outline is predicated is not from survey or equivalent data, but is based on general reconnaissance and on general information furnished by local residents. Too much reliance cannot be placed on it.

February 1951



SUB-PLAN

SCALE 1" = 500'

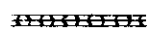


MAP LEGEND

Existing Dikes



Existing Riprap Bank Protection



HADLEY, MASS. EXISTING DIKES

FLOOD EMERGENCY MOBILIZATION PLAN

PREPARED BY
CORPS OF ENGINEERS, U.S. ARMY
OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION, BOSTON, MASS.

FEB. 1951

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HATFIELD, MASSACHUSETTS

General Conditions

As shown on the following map, there are about 12,500 feet of existing dike owned and maintained by the town. The three short sections of dike in the sub-plan, aggregating 800 feet in length, have a top elevation of about 134 feet m.s.l., while the main dike in front of the town has an elevation of approximately 129 feet m.s.l.

The three short dikes protect small isolated areas, in effect swales, or washes, drainage being provided by means of gated gravity drains. The 1936 flood elevation in the vicinity was about 134.5 feet m.s.l., or a half-foot above dike grade.

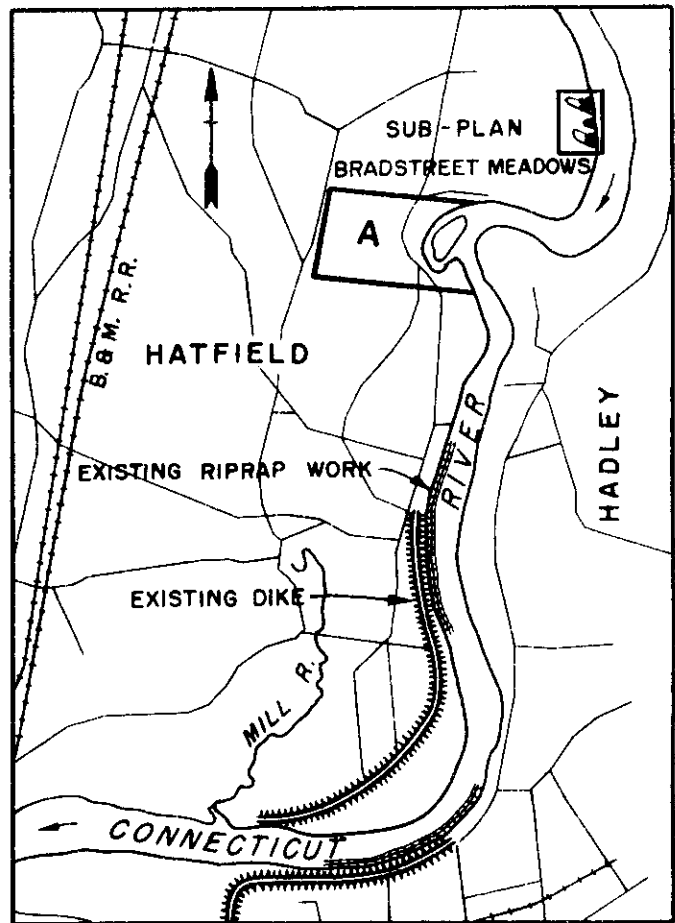
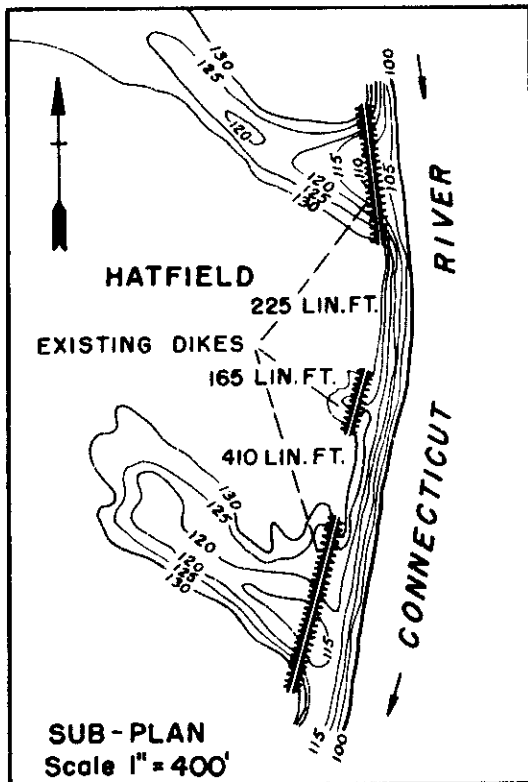
The main dike is designed to afford protection to the town. Its grade is about two feet under 1936 flood stage. At the bend in the river where the main dike is roughly paralleled by the Hadley dike across the river, the foreshore is being gradually washed away. At about the midpoint of the dike alignment, erosion is threatening the dike itself. There is no riprap at this point.

The dike generally is of very little value owing to the fact that water from the Connecticut River flows through the low swale at the point marked "A" on the attached map into the Mill River Valley and floods the town from back of this dike. This flow starts at a stage about five feet below dike grade. The dike's only service is that of a spur levee, lowering the backwater in the Mill River Valley and consequently the town during ordinary floods.

The only emergency measure of appreciable value would be the closing of the swale to prevent flow into the Mill River Valley. The opening at a stage equal to present dike grade would be about 500 feet wide and a sandbag dike at least 10 feet high would be required to meet this grade. This is not feasible. Lesser protection could be provided by a sandbag dike not exceeding three or four feet high at a maximum. The stage of the 1927 flood is probably the maximum for which protection could be provided.

NOTE: The information on which the above outline is predicated is not from survey or equivalent data, but is based on general reconnaissance and on general information furnished by local residents. Too much reliance cannot be placed on it.

February 1951



MAP LEGEND

- Existing Dikes 
- Existing Riprap Bank Protection 

HATFIELD, MASS. EXISTING DIKES

FLOOD EMERGENCY MOBILIZATION PLAN

PREPARED BY
CORPS OF ENGINEERS, U.S. ARMY
OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION, BOSTON, MASS.

TOWN OF HADLEY

	<u>Exchange</u>
<u>Selectmen:</u> Frank C. Reynolds, <u>Chairman</u>	Northampton 1590W
(Res.) 4 West St.	" 1765
Edward J. Jekanoski	Amherst 935M
William Chmura	Northampton 655-W2
<u>Street Superintendent:</u> Joseph Zatyryka	
(Res.) W. Maple St., Amherst RPD	Amherst 691W

TOWN OF HATFIELD

	<u>Hatfield Exchange</u>
<u>Selectmen:</u> John Cernak, <u>Chairman</u>	
Town Office, Main St.	2561
Res.	3964
Henry Bokina	2861
Henry Kugler	2561
<u>Highway Superintendent:</u> Francis Goodin	
Office	3211
(Res.)	4141
<u>Fire Department:</u>	3421

February 1951

KNIGHTVILLE DAM

The Knightville Dam is located on the Westfield River, Massachusetts, a tributary of the Connecticut, which has a total drainage area of 520 square miles. The area controlled by the reservoir is 164 square miles. The dam site is located in the village of Knightville, Massachusetts, about 27.5 miles above the confluence of the Westfield and Connecticut Rivers.

The construction of the dam and appurtenances was completed during the fall of 1941. The reservoir is now available for flood storage.

The maintenance and operation of the structure is a responsibility of the New England Division. Gate operation is controlled normally by direct instructions to the damtender from the Reservoir Regulation Section of the Engineering Division. In case of breakdown of the telephonic communication system, the damtender will operate gates in accordance with instructions contained in the Manual for Operators of Flood Control Dams of the Connecticut River Flood Control Project, issued by this office. It is expected that in the near future, a revised Manual for Maintenance and Operation of the Knightville Reservoir will be issued, superseding the above named Manual.

O on Gage = El. 480 (Invert of Gates)

Damtender - Floyd B. Anderson
Phone - Huntington, Mass., 2621

Asst. Damtender - Ernest J. Florence
Norwich Hill, Huntington, Mass.
Phone - Huntington, Mass., 2526

February 1951

BIRCH HILL DAM

The Birch Hill Dam is located on the Millers River, Massachusetts, a tributary of the Connecticut River, which has a total drainage area of 390 square miles. The area controlled by the reservoir is 175 square miles. The dam is located 1.3 miles northeast of South Royalston, Massachusetts, and about 27.3 miles above the confluence of the Millers and Connecticut Rivers.

Construction of the dam was completed in 1942. The reservoir is now available for flood storage.

The maintenance and operation of the structure is a responsibility of the New England Division. Gate operation is controlled normally by direct instructions to the damtender by the Reservoir Regulation Section of the Engineering Division. In case of breakdown of the telephonic communication system, the damtender will operate the gates in accordance with instructions contained in the Manual of Operation, Birch Hill and Tully Reservoirs.

0 on Gage = El. 815 (Invert of Gates)

Damtender - Walter R. Divoll

South Royalston, Massachusetts

Phone - Athol 1278

Asst. Damtender - S. M. Fiske

South Royalston, Massachusetts

Phone - None

February 1952

TULLY DAM

The Tully Dam is located on the east branch of the Tully River, Massachusetts, a tributary of the Connecticut River, having a drainage area of 74 square miles. The area controlled by the dam is 50 square miles. The dam site is located 4 miles north of Athol, Massachusetts, and about 3.9 miles above the confluence of the Tully and Millers Rivers.

The construction of the dam was essentially completed in December 1948. The reservoir is now available for flood storage.

The maintenance and operation of the structure is a responsibility of the New England Division. Gate operation is controlled normally by instructions to the damtender from the Reservoir Regulation Section of the Engineering Division through the damtender at Birch Hill Dam. In case of breakdown of the telephonic communication system between Athol and Boston, the damtender will operate the gates in accordance with instructions from the damtender at Birch Hill Dam as contained in the Manual of Operation, Birch Hill and Tully Reservoirs.

0 on Gage = El. 625.0 (Invert of Gates)

Damtender - Harold A. Small

Phone - Athol - 463

Asst. Damtender - Ralph A. Parker

18 Summit Street

Orange, Mass.

Phone - Orange 83 W

February 1952

SURRY MOUNTAIN DAM

The Surry Mountain Dam is located on the Ashuelot River, New Hampshire, a tributary of the Connecticut, having a total drainage area of 420 square miles. The area controlled by the reservoir is 100 square miles. The dam site is located about 5 miles northwest of Keene, New Hampshire, and about 34.6 miles above the confluence of the Ashuelot and Connecticut Rivers.

The construction of the dam was completed in May 1942. The reservoir is now available for flood storage.

The maintenance and operation of the structure is a responsibility of the New England Division. Gate operation is controlled normally by direct instructions to the damtender from the Reservoir Regulation Section of the Engineering Division. In case of breakdown of the telephonic communication system the damtender will operate the gates in accordance with instructions contained in the Manual of Reservoir Regulation for Surry Mountain Dam.

0 On Gage = El. 485 (Invert of Gates)

Damtender - Harry G. Lawton
Phone - Keene, N. H. 1610
Asst. Damtender - Eric J. Peacock
173 North Street
Keene, N. H.
Phone - Keene 956W
Asst. Damtender - Vernon H. Guyette
61 Billings Ave.,
Keene, N. H.
Phone - None

February 1952

UNION VILLAGE DAM

The Union Village Dam is located on the Ompompanoosuc River, a tributary of the Connecticut River. The area controlled by the reservoir is approximately 126 square miles. The dam site is located in the village of Union Village, Vermont, about four miles above the confluence of the Ompompanoosuc and Connecticut Rivers.

The construction of the dam and appurtenances was completed in December of 1949. The reservoir is now available for flood storage.

The maintenance and operation of the structure is a responsibility of the New England Division. Gate operation is controlled normally by direct instructions to the damtender from the Reservoir Regulation Section of the Engineering Division. In case of breakdown of the telephonic communication system, the damtender will operate gates in accordance with instructions contained in the Manual of Operation, Union Village Reservoir.

0 on Gage = El. 420. (Invert of Gates = 419.0)

Damtender - Stanley B. Alexander
Phone - Norwich (Vt) 1160

Asst. Damtender - R. A. Uline
P.O. Box 92
Lyme, N. H.
Phone - Lyme, N. H. 118-2

February 1952

WINSTED, CONNECTICUT

The flood protection system at Winsted extends along the Mad River from the Lake Street Bridge to a point 1,600 feet below Case Avenue Bridge, a distance of 4,875 feet. It is primarily a channel improvement and is made up of the following:

- a. Channel excavation
- b. Rock fill blanket
- c. Removal of existing dam
- d. Reconstruction of Pier under
Manchester Grain Mill
- e. Construction of concrete channel
lining under Winsted Motor Sales
& Manchester Grain Mill.

The improvements provide a channel to handle floods of 5,000 cubic feet per second with a minimum freeboard of 2 feet below the center line profile of Main Street.

The procedure to be followed in this area in the event of flood consists principally of patrolling to determine if floating debris is clogging the channel at any point. Any such obstruction should be removed as soon as possible before there is time for it to accumulate. Danger spots where such log and tree jams could occur are at the following buildings which span the river.

Colt Building
Winsted Motor Sales
Manchester Grain Mill
Madin Garage

February 1952

WINSTED, CONNECTICUT

Phone

Mayor: P. Francis Hicks
Residence: 34 Rock Street Winsted 1225

Superintendent of Public Works: Gordon A. Whyte
Central Fire House
Elm Street Winsted 65
Residence: 204 Gilbert Avenue Winsted 304 J-1

Police Department: William E. Mulcahy, Superintendent
Town Hall
338 Main Street Winsted 400

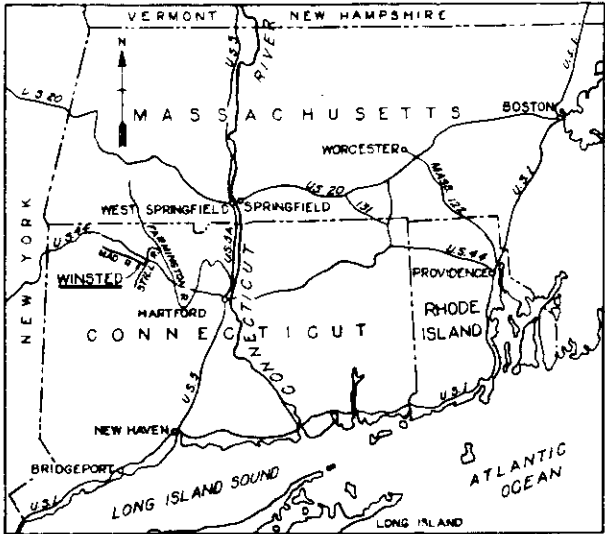
Fire Department: Roy J. Reutter
Fire Marshal
Central Fire House
Elm Street Winsted 280

Chamber of Commerce: Mrs. Theodore Davis, Secretary
c/o Winsted Citizen
448 Main Street Winsted 2222

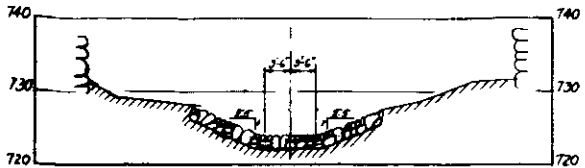
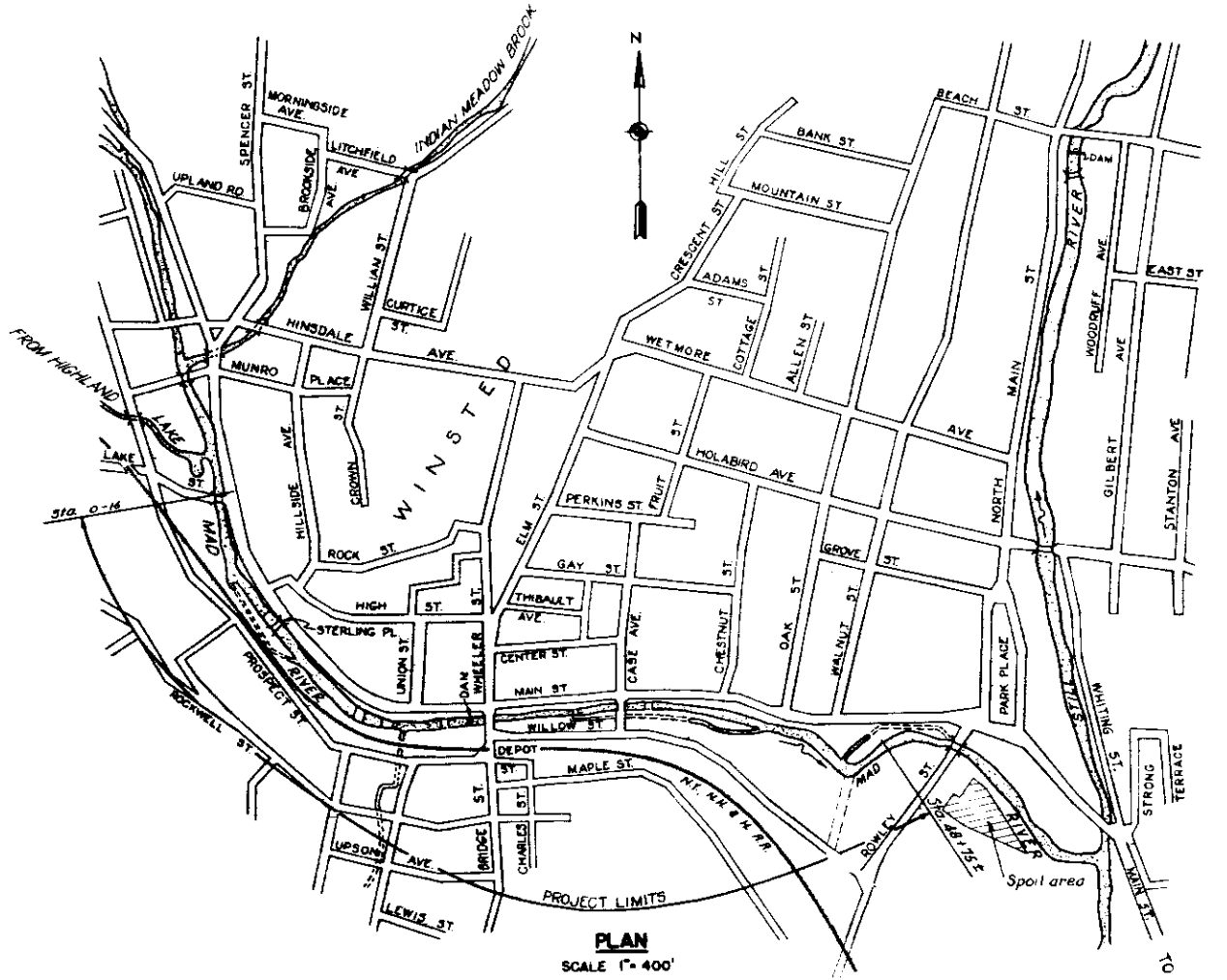
Nearest State Police Barracks:

Barracks B, Canaan, Conn. Canaan 218
Barracks L, Litchfield, Conn. Litchfield 700

February 1952

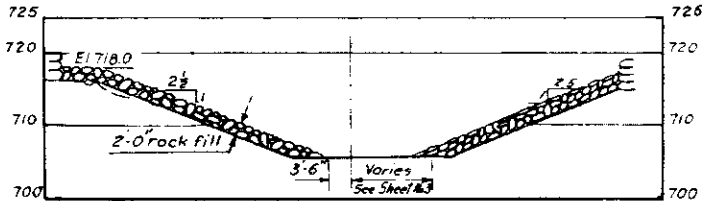


LOCATION MAP
SCALE IN MILES
0 10 20



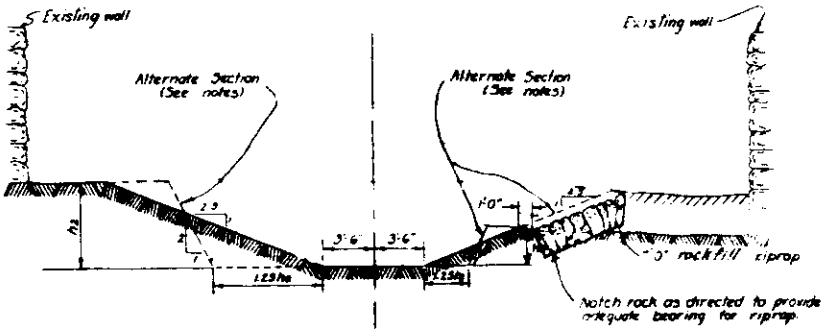
SECTION AT STA. 3+18

INDEX TO DRAWINGS	
SHEET NO.	DESCRIPTION
1	PROJECT LOCATION AND INDEX
2	PLAN AND PROFILE NO. 1
3	PLAN AND PROFILE NO. 2
4	PLAN AND PROFILE NO. 3
5	PLAN AND PROFILE NO. 4



SECTION AT STA. 21+50

TYPICAL FROM STA 20+0 TO STA 22+25



HALF-SECTION SHOWING TYPICAL
CONSTRUCTION IN ROCK

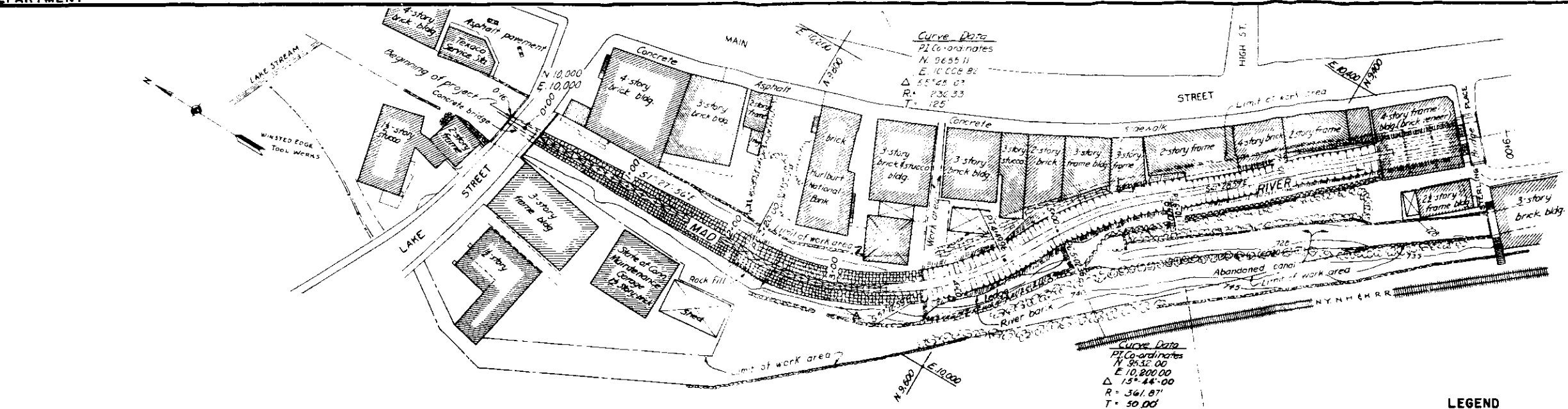
HALF-SECTION SHOWING TYPICAL
CONSTRUCTION IN EARTH AND ROCK

SCALE 1" = 5'

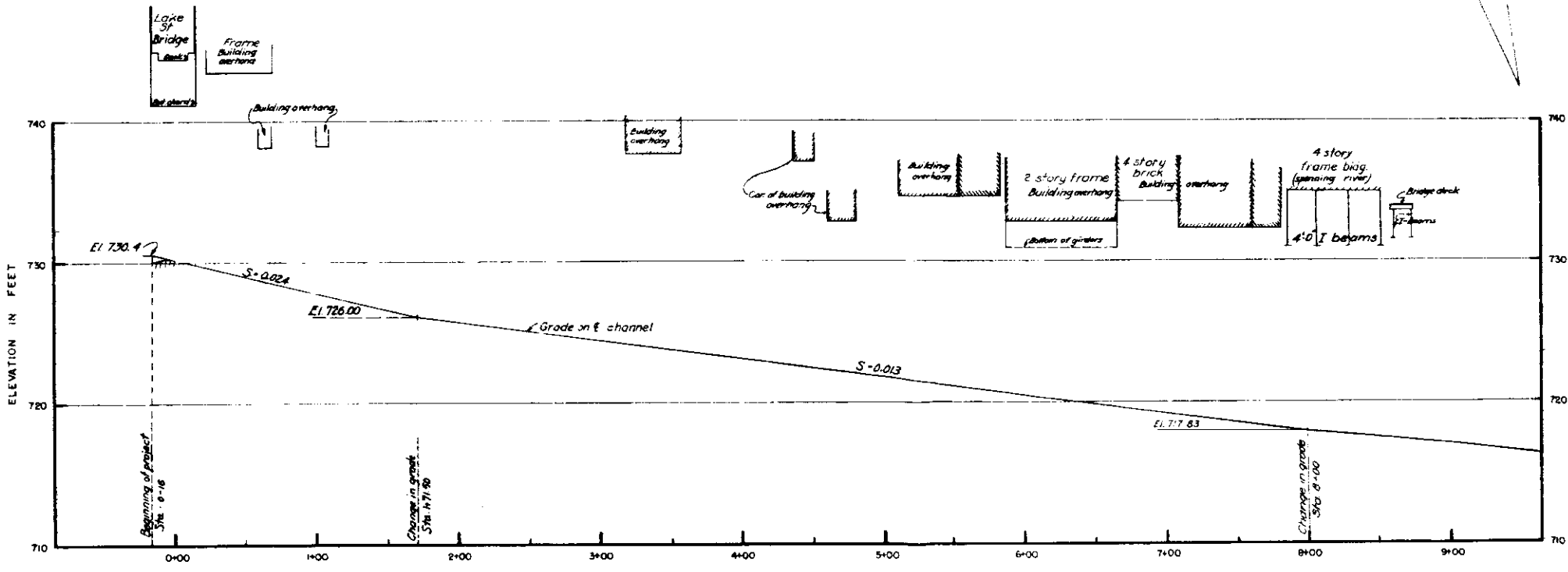
CONNECTICUT RIVER FLOOD CONTROL
CHANNEL IMPROVEMENT
WINSTED, CONNECTICUT
PROJECT LOCATION AND INDEX
MAD RIVER CONNECTICUT

SCALE: 1 IN. = 400 FT.
SHEET NO. 1

FLOOD EMERGENCY MOBILIZATION PLAN
PREPARED BY
CORPS OF ENGINEERS, U. S. ARMY
OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION BOSTON, MASS
JAN. 1952.



- LEGEND**
- Rock fill Riprap (slope)
 - Rock fill Riprap (barren and channel bottom)
 - Retaining wall (Existing)
 - Retaining wall under overhanging building (Existing)
 - Original ground surface
 - Approx. rock surface
 - Rock cut (slope)
 - Limit of work area

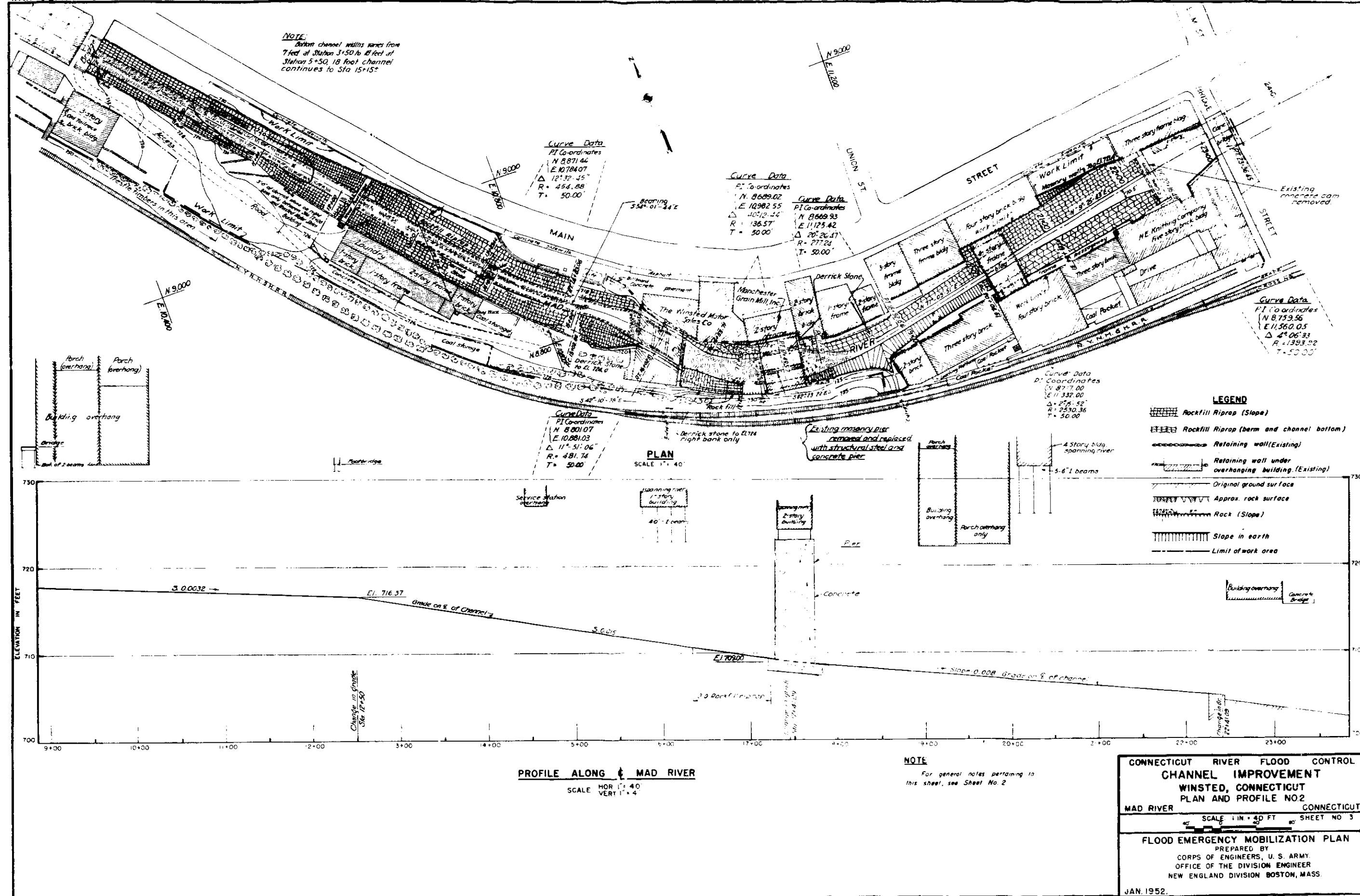


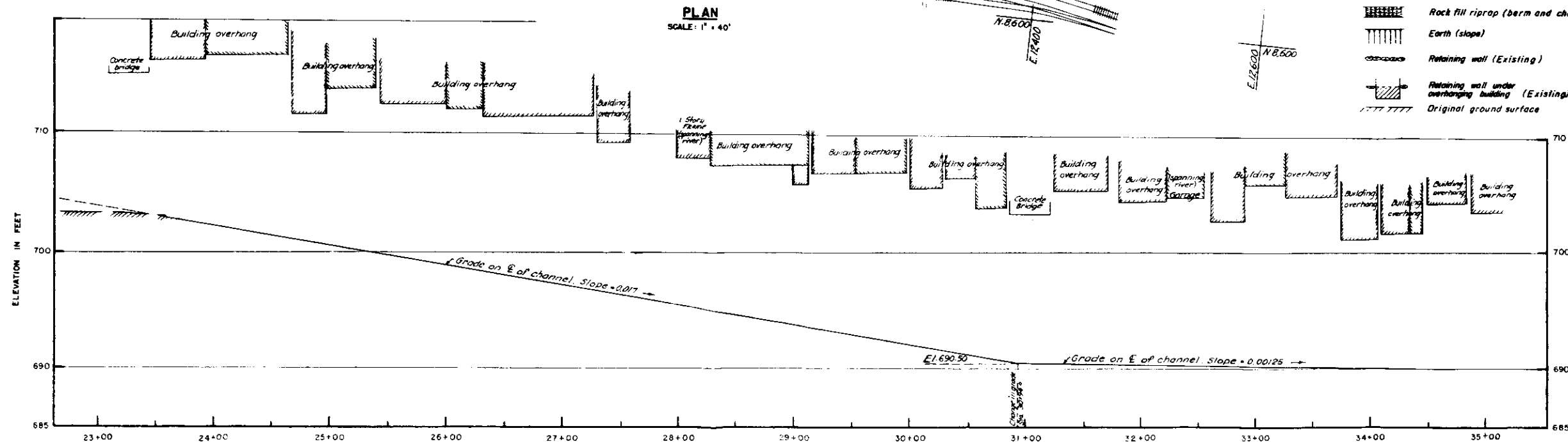
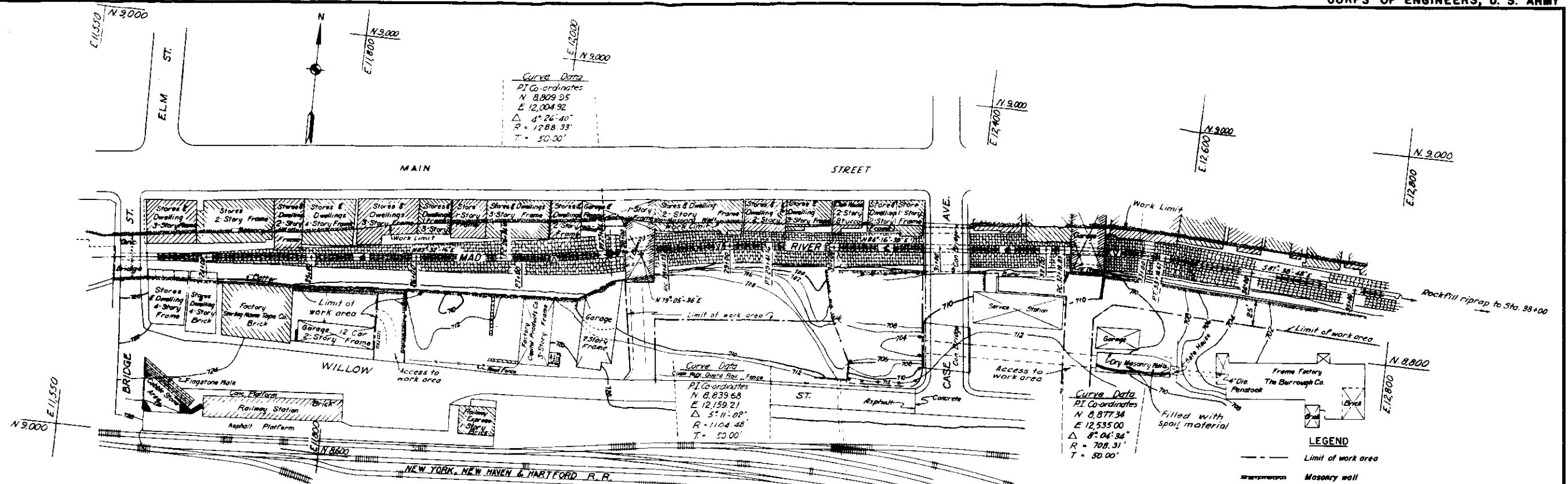
NOTES

Elevations refer to Mean Sea Level Datum.
Contour interval as shown.
Coordinates refer to N10,000, E10,000 at line point, center of Lake Street Bridge.

Limits of rock cut and riprap, shown on Sheets 2,3,4,5 are approximate only.
Building overhangs shown on profile drawing refer to those on left bank only.
Channel cut in ledge between Sta. 3+50 and Sta. 9+00.
Channel width = 7' from Sta. 0+00 to Sta. 3+50 transition from 7' to 18' between Sta. 3+50 and Sta. 5+50, 18' from Sta. 5+50 to Sta. 9+00.

CONNECTICUT RIVER FLOOD CONTROL
CHANNEL IMPROVEMENT
WINSTED, CONNECTICUT
PLAN AND PROFILE NO. 1
MAD RIVER CONNECTICUT
SCALE 1 IN. = 40 FT. SHEET NO. 2
FLOOD EMERGENCY MOBILIZATION PLAN
PREPARED BY
CORPS OF ENGINEERS, U. S. ARMY.
OFFICE OF THE DIVISION ENGINEER
NEW ENGLAND DIVISION BOSTON, MASS.
JAN. 1952.





NOTE

For general notes pertaining to this sheet, see Sheet No 2.

CONNECTICUT RIVER FLOOD CONTROL

**CHANNEL IMPROVEMENT
 WINSTED, CONNECTICUT**

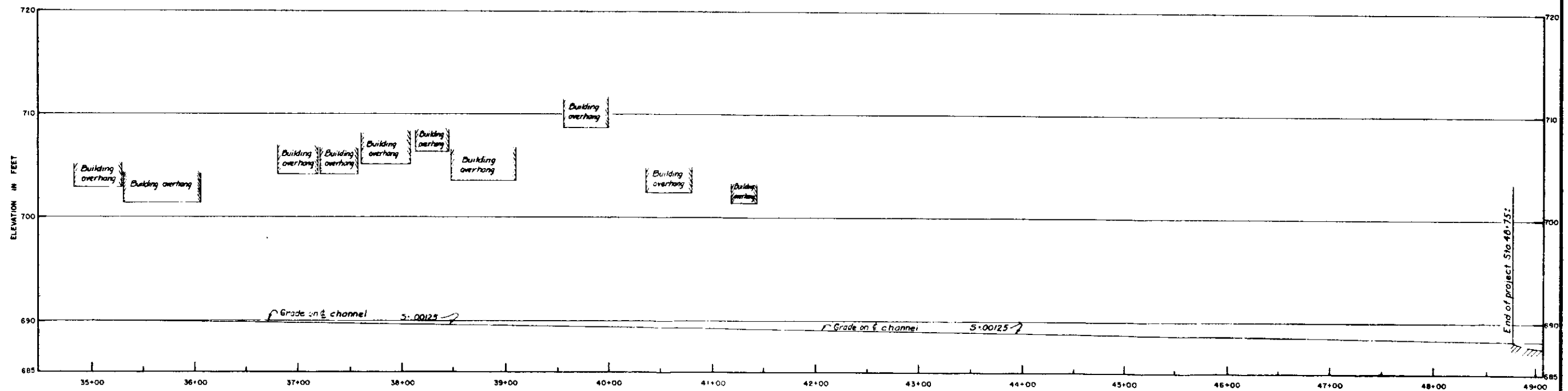
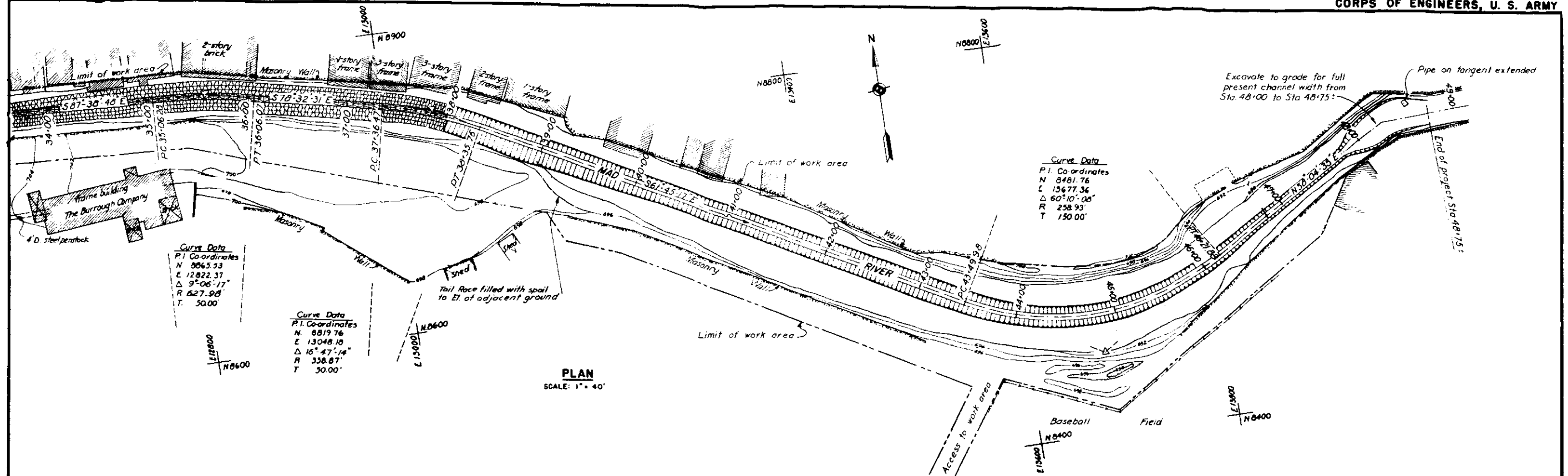
PLAN AND PROFILE NO.3

MAD RIVER CONNECTICUT

SCALE: 1" = 40 FT SHEET NO 4

FLOOD EMERGENCY MOBILIZATION PLAN

PREPARED BY
 CORPS OF ENGINEERS, U. S. ARMY
 OFFICE OF THE DIVISION ENGINEER
 NEW ENGLAND DIVISION, BOSTON, MASS.
 JAN. 1952.



PROFILE ALONG MAD RIVER

SCALE: HOR. 1" = 40'
VERT. 1" = 4'

NOTE

For general notes pertaining to this sheet see Sheet No 2

CONNECTICUT RIVER FLOOD CONTROL	
CHANNEL IMPROVEMENT	
WINSTED, CONNECTICUT	
PLAN AND PROFILE NO. 4	
MAD RIVER	CONNECTICUT
SCALE: 1 IN. = 40 FT.	
SHEET NO. 5	
FLOOD EMERGENCY MOBILIZATION PLAN	
PREPARED BY	
CORPS OF ENGINEERS U. S. ARMY	
OFFICE OF THE DIVISION ENGINEER	
NEW ENGLAND DIVISION BOSTON, MASS	
JAN, 1952	

HAVERHILL, MASSACHUSETTS

The flood protection system for Haverhill consists primarily of the following:

2,250 linear feet of concrete flood wall, with
provision for installation of flashboards
2 feet in height

2,000 linear feet of concrete pressure conduit
(Little River conduit) •

1 pumping station

2,200 linear feet of marginal sewer along flood wall

A system of diversion sewers along Little River conduit.

A reinforced concrete flood wall with a top elevation of 24.0 extends for approximately 2,250 feet along the north bank of the Merrimack River. Concrete wing walls extend from this wall to high ground at each end to prevent the entrance of water at these points. A pressure conduit of reinforced concrete, known as the Little River conduit, enters at approximately the mid-point of the flood wall and extending back for a distance of approximately 2,000 feet, protects the central portion of the business district from water backing up through the Little River. The sewerage and drainage systems of Haverhill normally discharge at numerous points into the Merrimack River and Little River conduit. In order that these discharges may be closed at flood time, a "marginal sewer", so-called, was built along the landside of the flood wall and a system of diversion sewers was constructed on each side of the Little River conduit. All of these lead into the pumping station which is situated near the intersection of the conduit with the flood wall.

The method and sequence of operation in prosecuting a flood fight are set forth in detail in the Operation and Maintenance Manual for Flood Protection System, Haverhill, Massachusetts, issued by this office and furnished to the City. •

The procedure, in general, is as follows:

1. At first threat of flood, inspection should be made of flashboards, including inspection of pipe supports, sheathing, framing and metal fastening, and any necessary corrective measures taken in order that they may be quickly assembled.

February 1951

2. At first threat of flood, inspection should be made to insure that the two pressure manholes in the Little River conduit are closed tightly. One of these manholes is located near the Hamel Leather Company building and the other 30 feet downstream from Locust Street.

3. Pumping operations will be required when the stage of the river reaches Elevation 11. Prior to the start of pumping, valves to prevent backwater into the marginal sewer shall be closed as follows:

- a. The 24" sluice gate at the foot of Jacob Court.
- b. The two 4-foot timber gates between the pumping station and Little River conduit.
- c. The 24" sluice gate, 20 feet east of the center of the Little River conduit at the back of the flood wall.
- d. The 16" sluice gate at the foot of Kimball Place.

4. As soon as the pumping station has been put in operation, valves to enable the diversion sewers to operate shall be closed as follows:

- a. The two 18" flap valves in backwater Gate Chamber No. 2.
- b. The two 4-foot timber gates at Locke Street east of Little River, and the two 2'-6" timber gates at Locke Street west of Little River.
- c. The 16" sluice gate at the corner of Locust and Orchard Streets.
- d. The 20" sluice gate west of Oak Terrace.
- e. The 24" sluice gate on High Street between Arch and Essex Streets.
- f. The 30" square sluice gate at Lewis and Winter Streets.
- g. The 30" x 36" sluice gate at Hale and Winter Streets.
- h. The four 12" gate valves that control the flow of sewage from the Main Building of the Hamel Plant.
- i. The two 12" gate valves located between the Little River conduit and the rear of the Lang Building (Hamel Leather Company).

February 1951

j. The 24" round gate valve on the overflow between the Tilton Building and the Little River conduit.

5. A steel flood gate, eleven feet wide, adjacent to the Main Street Bridge should be closed when the stage of the river reaches Elevation 12.

PREVIOUS HIGH WATER ELEVATIONS

Groveland Highway Bridge
Elev. M.S.L.

Mar. 1936 Flood - Approximately.....24.7

Sep. 1938 Flood - Approximately.....18.0

ESTIMATED SANDBAG REQUIREMENTS

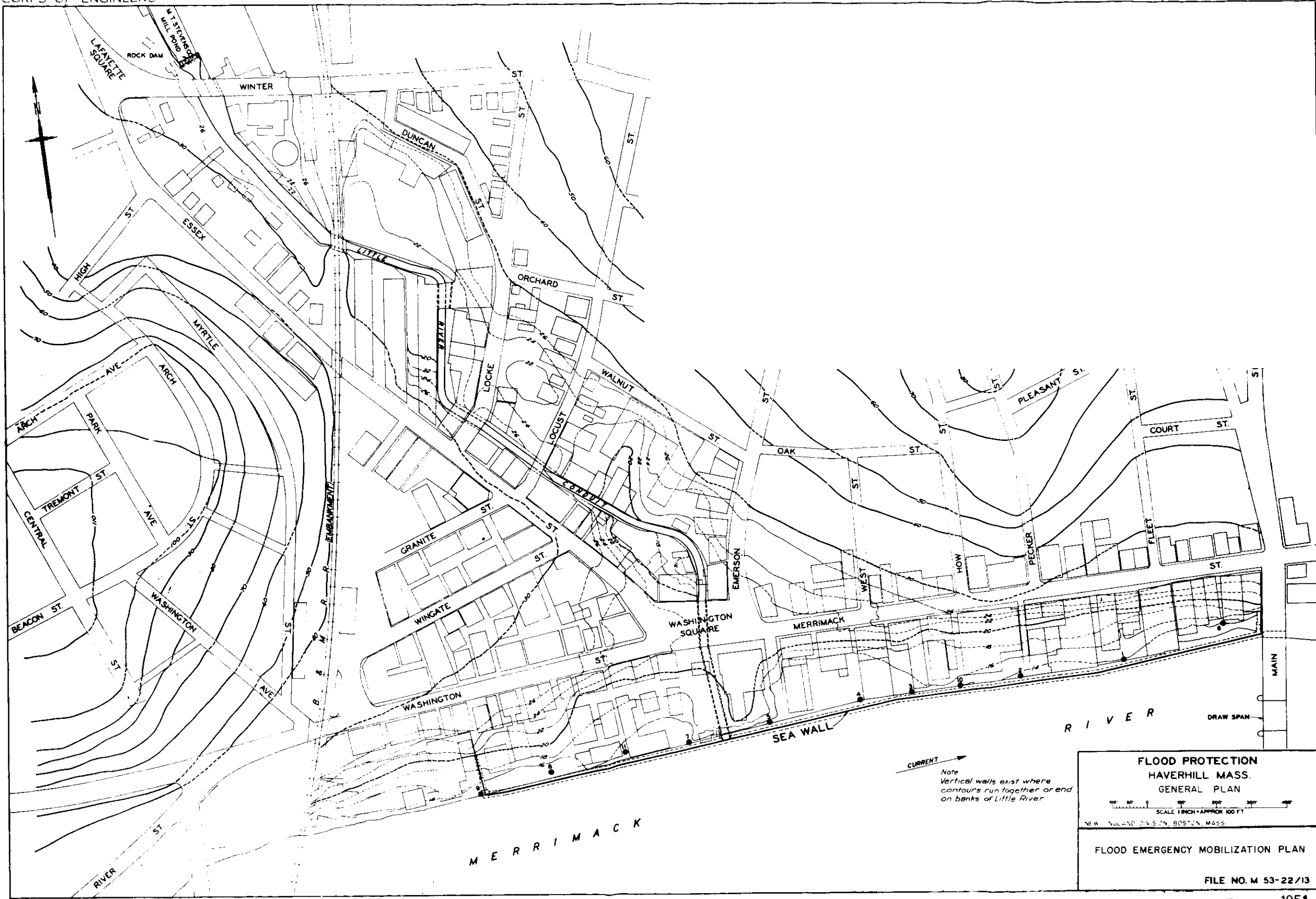
Recommended stock level for storage - 2,000 to 4,000
On hand 10 January 1954 - 2,000

February 1954

CITY OF HAVERHILL, MASS.

Haverhill
Exchange

<u>Mayor:</u>	Bernard L. Durgin City Hall (Res.) 813 Main Street	4-4571 2-6543
<u>City Manager:</u>	Daniel McLean City Hall (Res.) 730 Broadway	2-1111 2-7097
<u>Superintendent of Maintenance and Operation of Flood Protection System:</u>	Harry W. Bailey City Engineer City Hall (Res.) 91 Mt. Vernon St.	3-3931 2-5066
	Julius H. Kritter City Engineer Office (Res.) 162 North Ave.	3-3931 4-6771
<u>Superintendent of Highways:</u>	City Garage	4-5151
<u>Pumping Station:</u>		4-6861
<u>Chamber of Commerce:</u>	5 Washington St.	4-5663
<u>Police Department Headquarters:</u>	Main Street	4-4711
<u>Fire Department Headquarters:</u>	Essex St.	3-3833
<u>Red Cross Headquarters:</u>	11 Hamilton Avenue	2-6871
<u>Utilities</u>		
Haverhill Electric Company	121 Merrimack St.	4-4741
Haverhill Gas Light Company	63 Merrimack St.	4-6311
<u>Transportation</u>		
Boston & Maine Railroad		3-3721
<u>Communication</u>		
Western Union Telegraph Company	16 Emerson Street	4-6363
New England Telephone & Telegraph Co.	33 Winter Street	4-9911
<u>Nearest State Police Barracks:</u>	Andover, Mass. Topsfield, Mass.	And. 798 Tops. 95



**FLOOD PROTECTION
HAVERHILL MASS.
GENERAL PLAN**

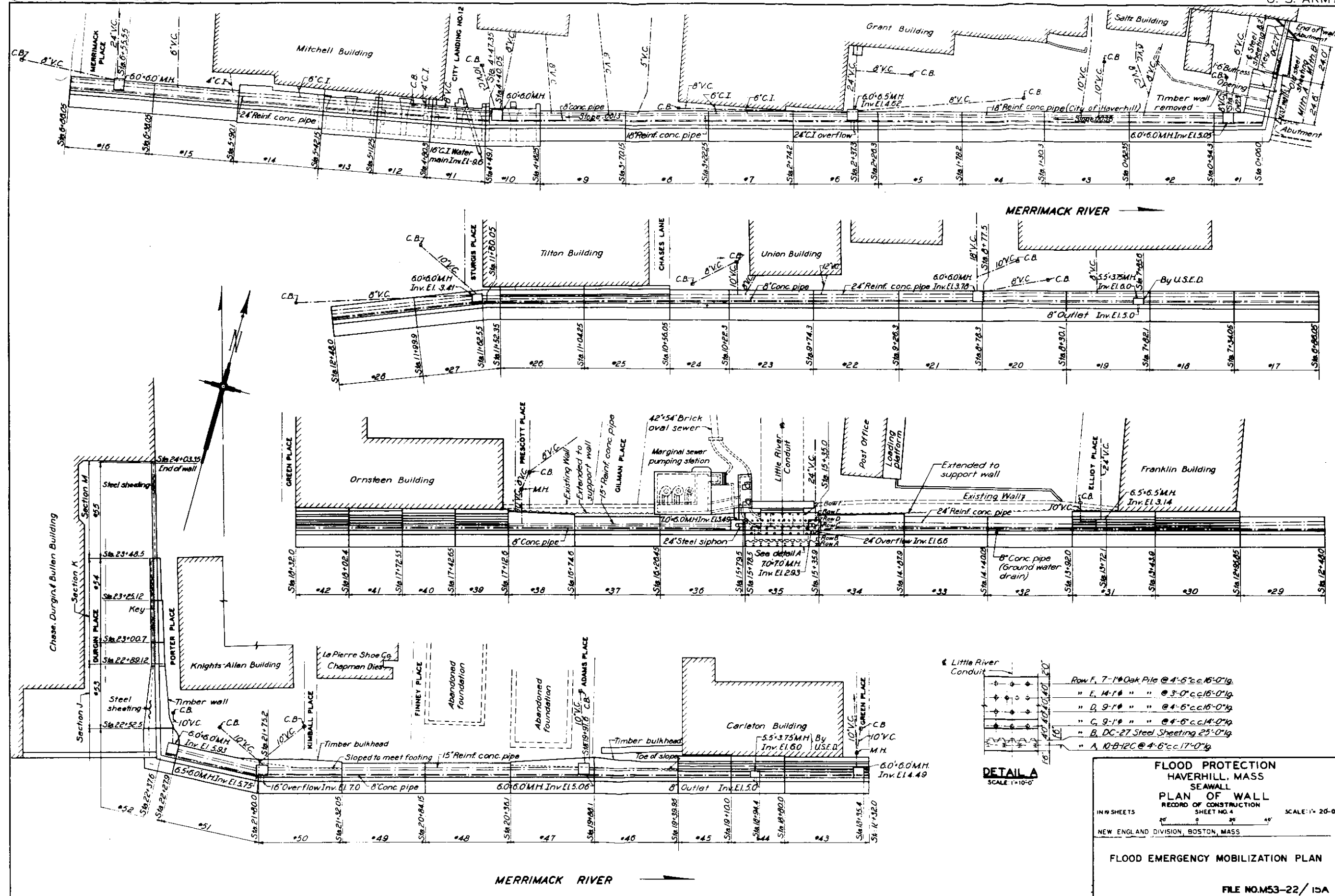
100' 200' 300' 400' 500'

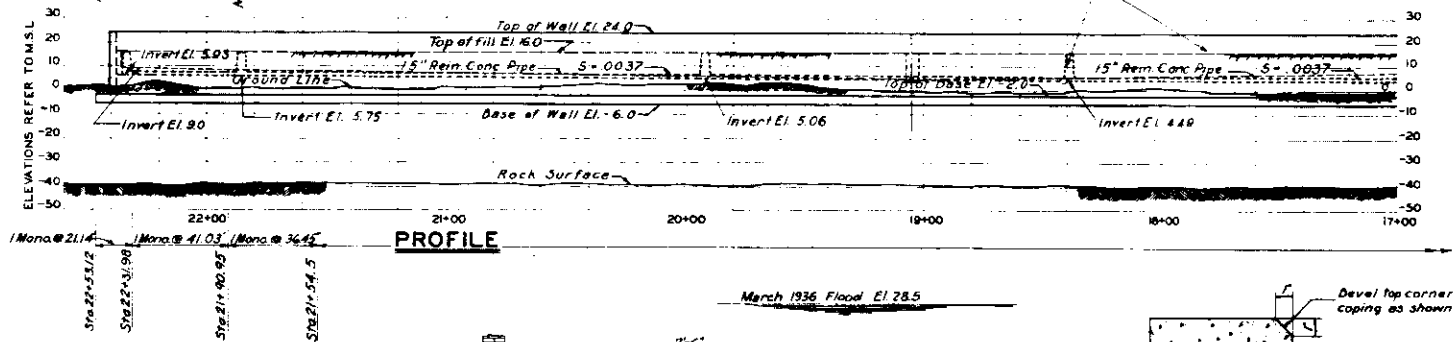
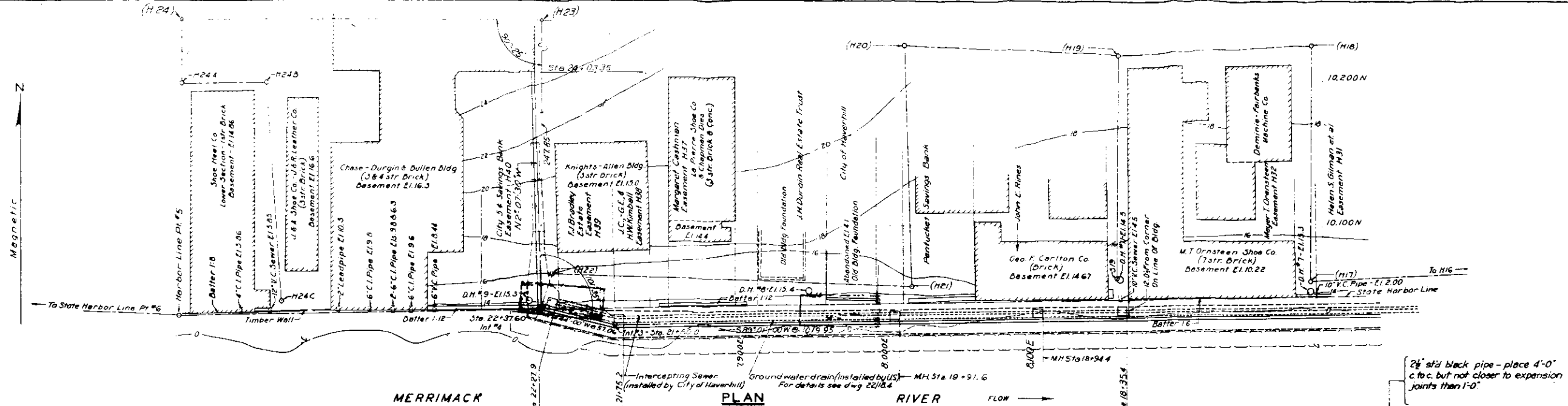
SCALE 1 INCH = APPROX 100 FT

NEW ENGLAND DIVISION, BOSTON, MASS.

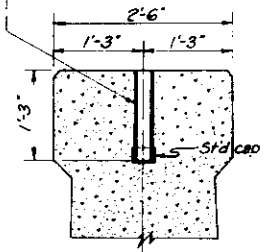
FLOOD EMERGENCY MOBILIZATION PLAN

FILE NO. M 53-22/13

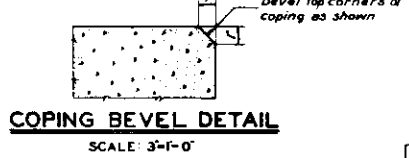




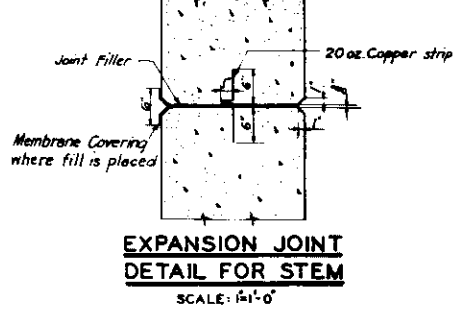
24\"/>



DETAIL OF PIPE SOCKET FOR FLASHBOARD SUPPORT
SCALE: 1\"/>



COPING BEVEL DETAIL
SCALE: 3\"/>



EXPANSION JOINT DETAIL FOR STEM
SCALE: 1\"/>

Timber piles:
Drive piles to rock or minimum penetration of 20 feet. Indicated bearing value of 30 tons required.

Sheet steel piling:
Drive to rock or minimum penetration of 24 feet, indicated bearing value of 13.5 T/sheet pile required.

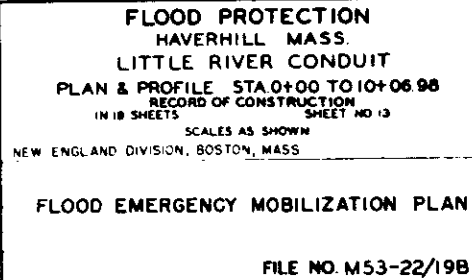
TYPICAL SECTION ON PILING
SCALE: 1\"/>

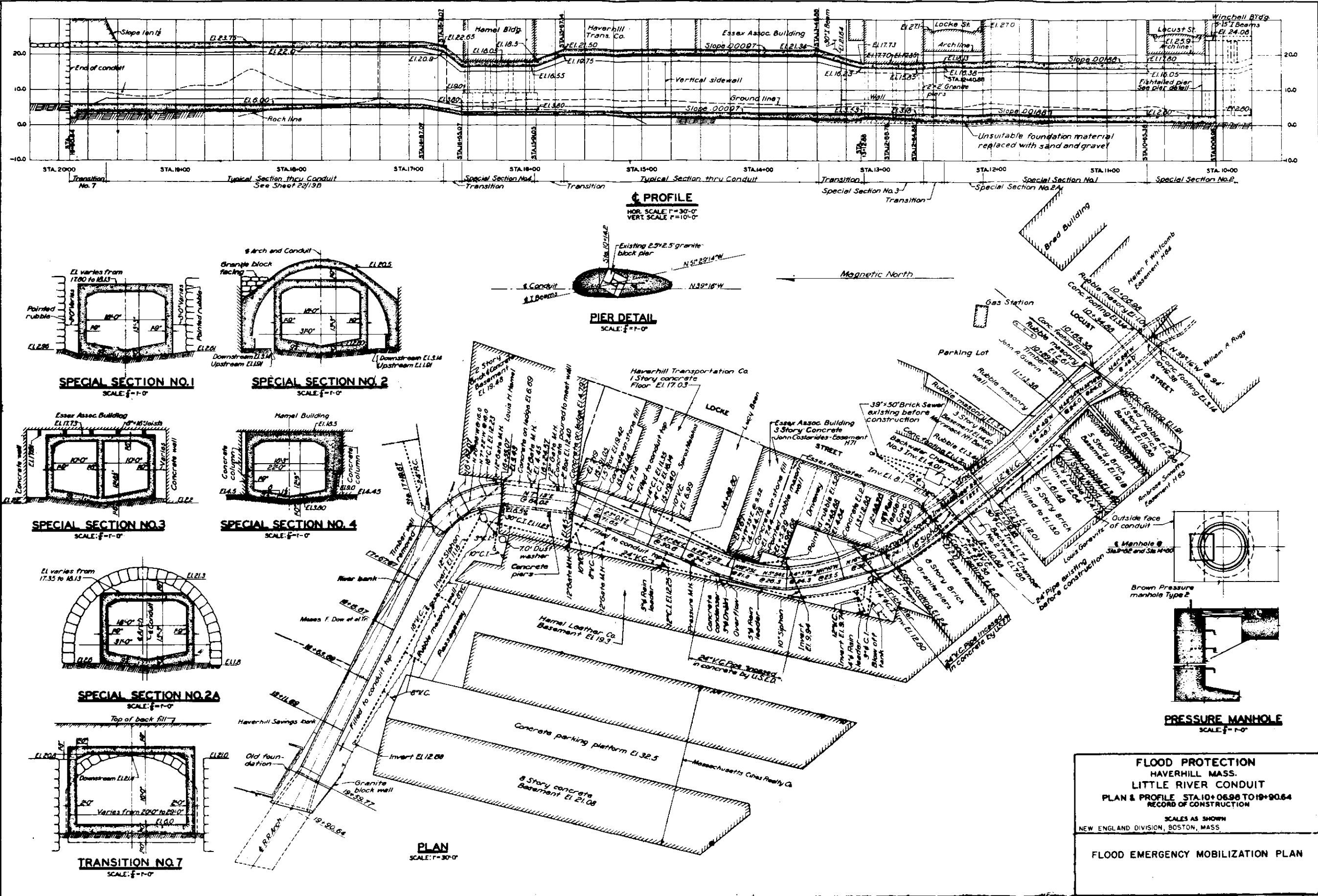
FLOOD PROTECTION
HAVERHILL, MASS.
SEAWALL
PLAN & PROFILE STA. 17+00 TO END
SCALE: H=3/8\"/>

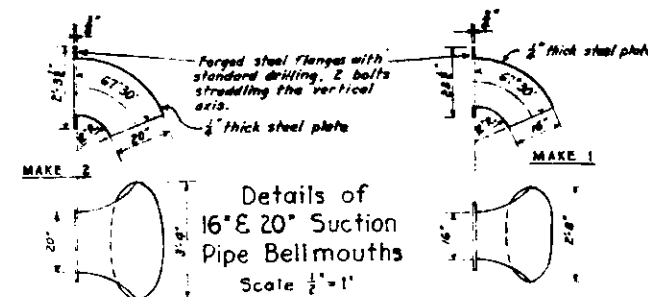
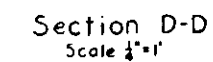
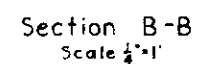
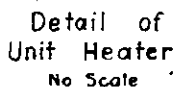
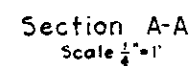
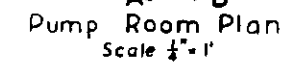
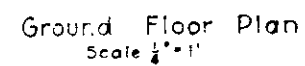
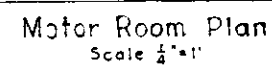
FLOOD EMERGENCY MOBILIZATION PLAN

FILE NO. M 53-22/16

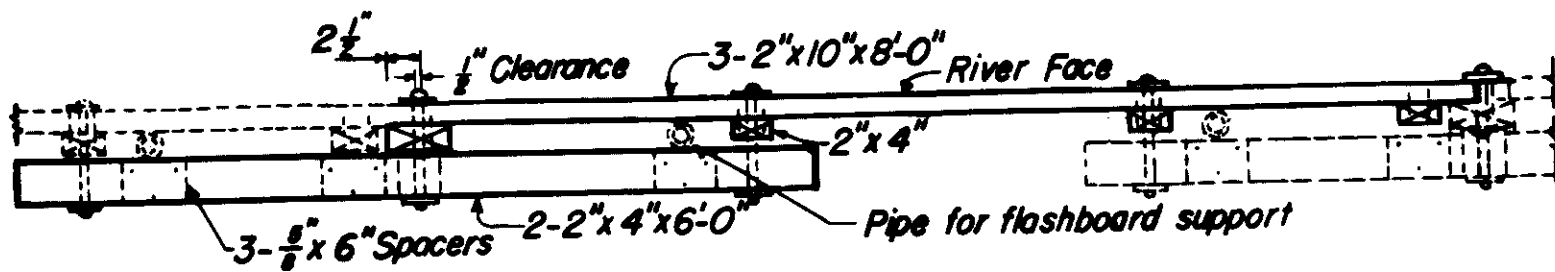
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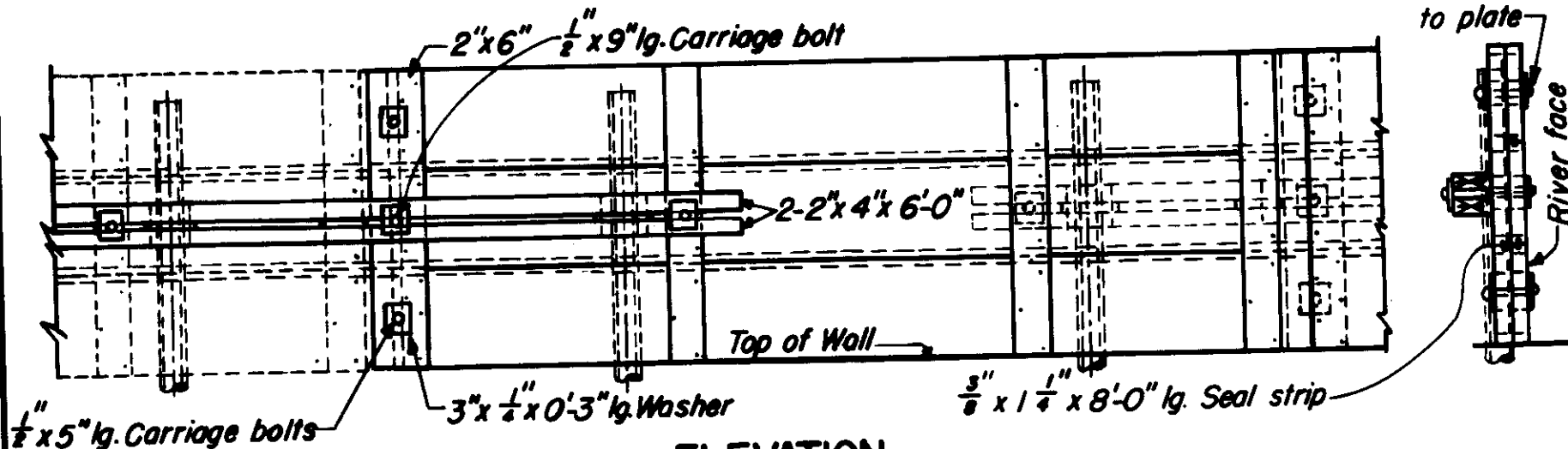




MERRIMACK RIVER FLOOD CONTROL
PUMPING STATION
HAVERHILL, MASS.
EQUIPMENT DETAILS
MERRIMACK RIVER MASSACHUSETTS
SCALES AS SHOWN
NEW ENGLAND DIVISION, BOSTON, MASS.
FLOOD EMERGENCY MOBILIZATION PLAN



PLAN



ELEVATION

FEB. 1951

311

HAVERHILL SEAWALL FLASHBOARD DETAILS

U.S. ENGRS. BOSTON, MASS. 12-10-38

SCALE 1 1/2" = 1'-0"
3 1/2" = 1'-0"

LOWELL, MASSACHUSETTS

The flood protection system for the City of Lowell consists of the following:

- 3,400 linear feet of impervious bank treatment
- 1,700 linear feet of concrete flood wall
- 2 pumping stations
- 1 stop-log structure

The system is divided into two separate sections as follows:

LAKEVIEW SECTION. - The protective structures for the Lakeview Section extend between the Aiken and Bridge Street bridges, a distance of 3,580 feet, and consist of improvement of an existing spoil bank for 2,700 feet and construction of 880 feet of a combination concrete and sheet piling flood wall bordering Front Street where space for a dike was not available. A 3-foot blanket of impervious silty and gravelly sand was placed against the excavated slope of the spoil bank which was graded to a slope of 1 on 3 to protect the bank from erosion. Drainage wells consisting of 2-inch diameter well points spaced 15 feet on centers extend into the coarse sand stratum and are connected to a perforated metal pipe drain laid in gravel backfill and leading to the pumping station. The sheet piling penetrates an impervious silt stratum with its upper portion encased in concrete and surmounted by a concrete wall with its top at Elevation 72.

The West Street Pumping Station is equipped with one 16" vertical shaft centrifugal volute pump with a capacity of 8,000 g.p.m. at an engine speed of 1200 r.p.m. and three 12" propeller type pumps each with a capacity of 55,000 g.p.m. at an engine speed of 1200 r.p.m. Attached to the east end of the pumping station is a reinforced concrete underground sewage collecting "inlet" chamber equipped with sluice gates for directing the flow of sewage and storm runoff either direct to the river as in normal times, or through a bar screen to the pumping station as required during flood periods.

The normal stage of the Merrimack River at the West Street Pumping Station is Elevation 51.0 M.S.L. Pumping operations will not be required until the stage of the river reaches Elevation 58.0 (9.2' on float gage at Inlet Chamber), unless the sewers are carrying heavy local storm runoff, in which case it may be necessary to begin pumping one or two feet lower.

ROSEMONT SECTION. - The protective structure for the Rosemont Section consists of an improved spoil bank extending from Beaver Street

February 1953

downstream a distance of 700 feet and a combination concrete and steel sheet piling cut-off flood wall extending from Beaver Street upstream along Beaver Brook, a distance of 830 feet. Construction is similar to that for the Lakeview Section. A concrete bulkhead is located at Beaver Street with provisions for the installation of stop-logs to a height of eight feet above the street level.

The Beaver Street pumping station is equipped with two 24" vertical shaft centrifugal volute pumps, each pump having a capacity of 12,500 g.p.m. at an engine speed of 1200 r.p.m. Attached to the concrete substructure of the station is the concrete inlet chamber which receives the flow of sewage from the city sewers of the Rosemont area. From the inlet chamber the sewage in normal times flows by gravity through an opened sluice gate into a discharge conduit emptying into Beaver Brook; and in flood times through a bar screen to the centrifugal pumps, the sluice gate then being closed.

The normal stage of the Merrimack River at the mouth of Beaver Brook is elevation 52.6 M.S.L. Pumping operations will not be required until the stage of the river reaches approximately Elevation 60.0 (9.5' on float gage of inlet chamber), unless the sewers are carrying heavy local storm run-off, in which case it may be necessary to begin pumping one or two feet lower.

AREA PROTECTED. - The total area protected in the Rosemont and Lakeview Sections comprises approximately 120 acres of developed urban territory. In conjunction with the already completed channel improvements at Lowell and the Franklin Falls and Blackwater Dams, the height of the dikes and flood walls are such as to provide protection against a flood of the magnitude of March 1936 with a freeboard of approximately one foot.

PREVIOUS HIGH WATER ELEVATIONS

Aiken Street Bridge
Elev. M.S.L.

Mar. 1936 Flood - Approximately80.0
Sep. 1938 Flood - Approximately71.3

ESTIMATED SANDBAG REQUIREMENTS

Stop-log closure	1,000
Sand boils and sloughs	2,000
Raising wall one (1) foot	5,000
Raising dike one (1) foot	10,000

TOTAL 18,000

Recommended stock level for storage - 3,000 to 5,000

On hand 10 January 1953 - 0

Available - 3,000

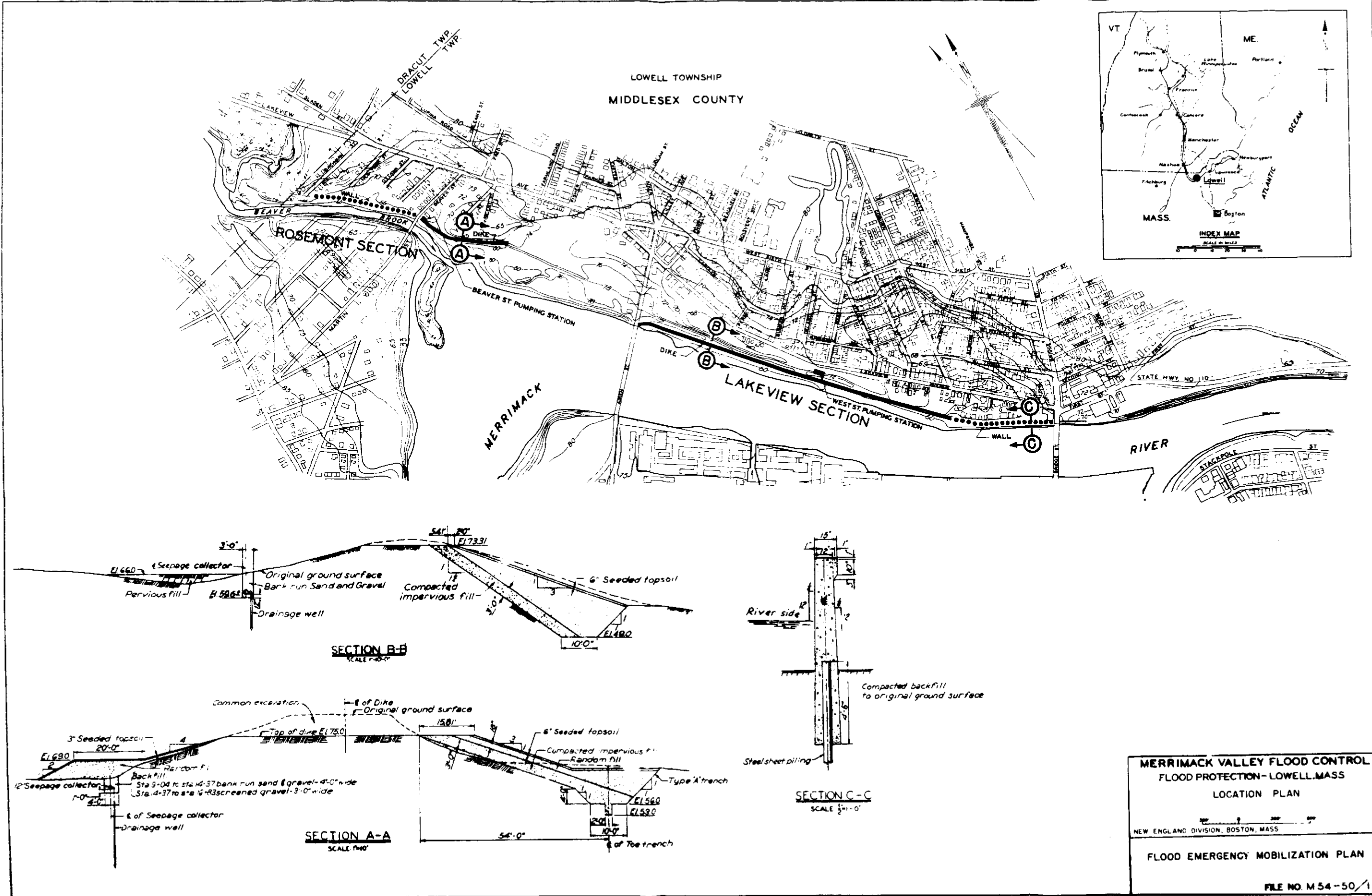
February 1953

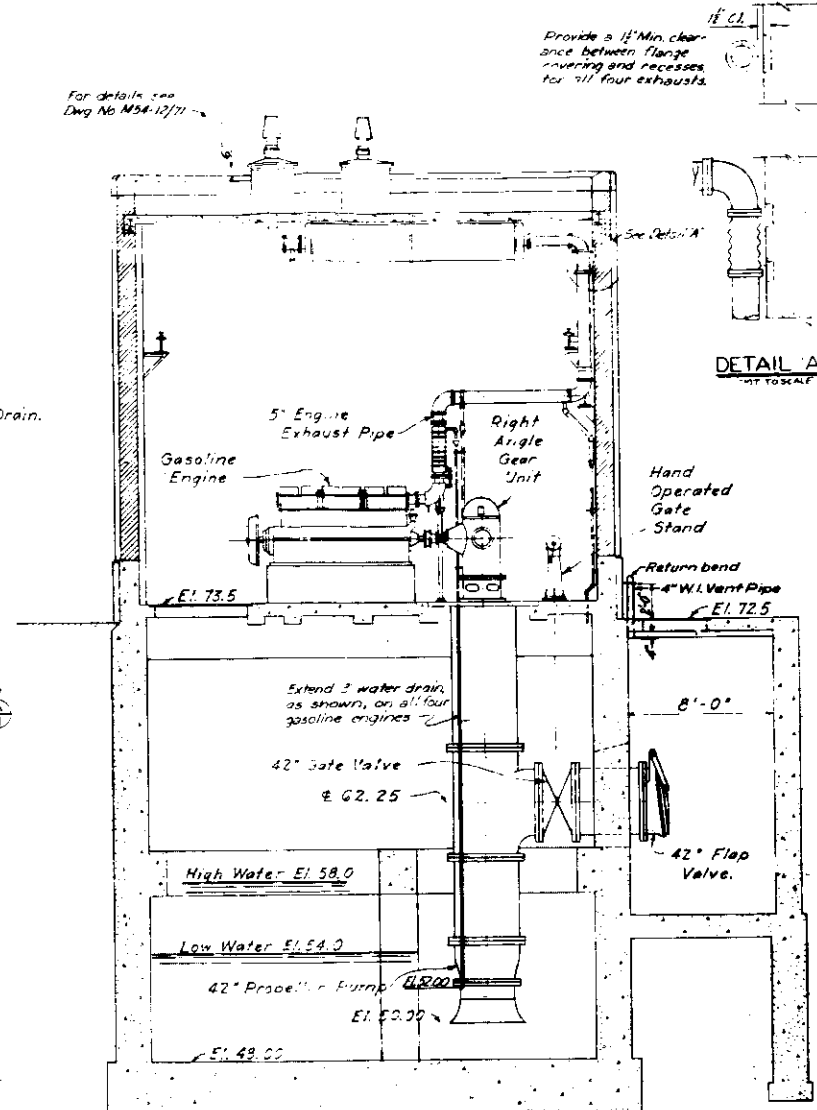
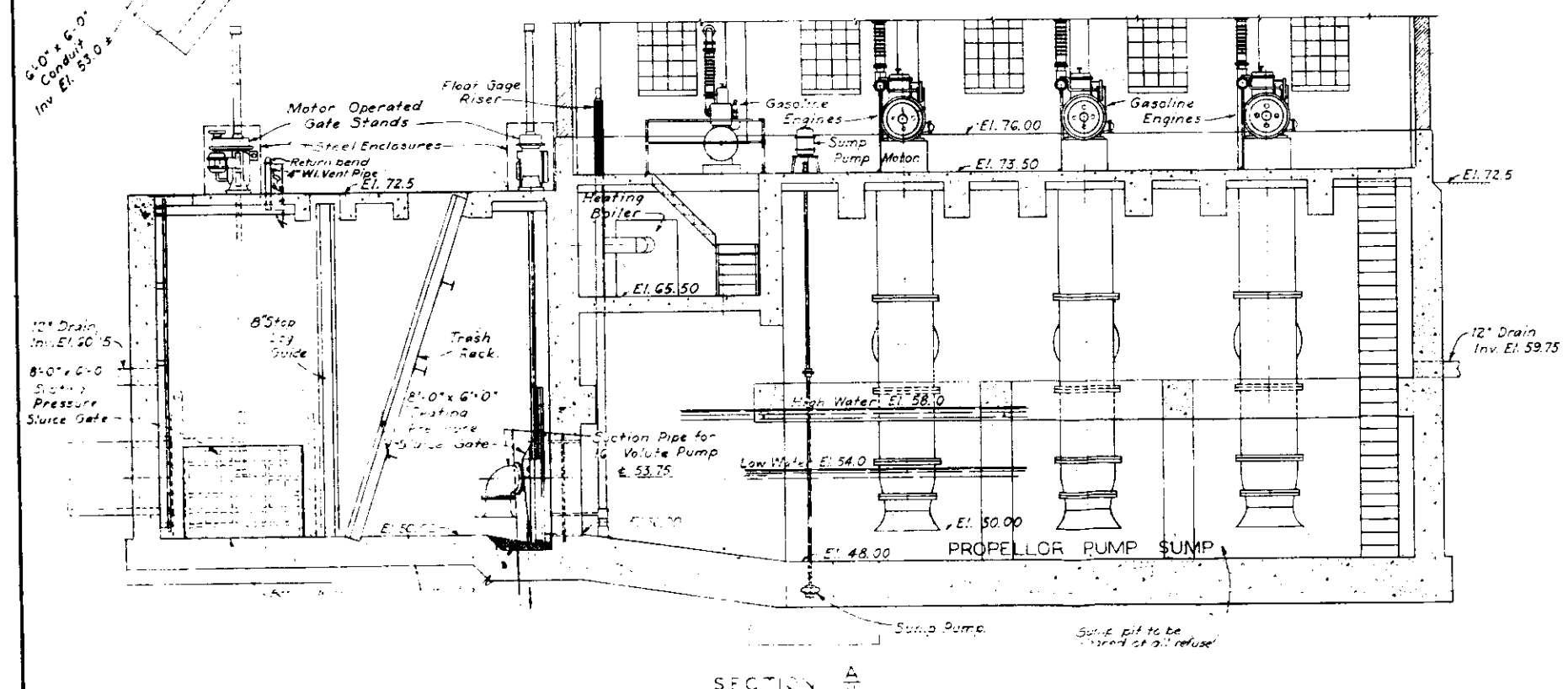
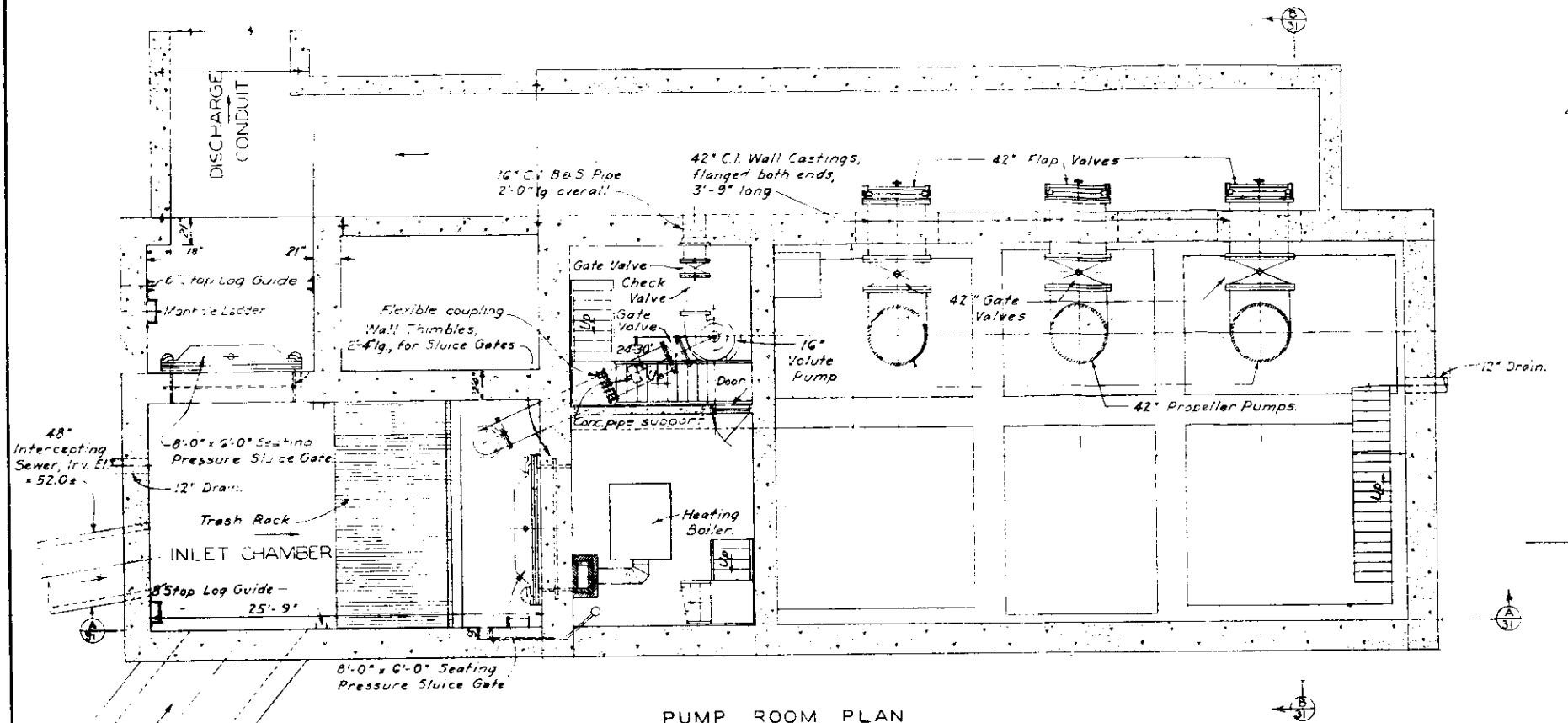
CITY OF LOWELL, MASS.

Lowell
Exchange

<u>Acting Mayor:</u>	Samuel S. Pollard City Hall (Res.) Fairmont Street	6321
<u>City Manager:</u>	Frank Barrett City Hall (Res.) 20 Rivercliff Road	6322 2-6108
<u>Superintendent of Public Works:</u>	Edward D. Barton City Hall (Res.) 27 Alder Street	3-2701 2-6157
<u>Maintenance Employee for Flood Control Works:</u>	William A. Taylor (Res.) 56 Stanley Street	3-1667
<u>Chamber of Commerce:</u>	45 Merrimack Street	5633
<u>Police Department Headquarters:</u>	Market Street	7621
<u>Water Department:</u>	City Hall	8509
<u>Fire Department Headquarters:</u>	Palmer Street	5454
<u>Red Cross Headquarters:</u>	391 Pawtucket Street	6347
	<u>Utilities</u>	
	Lowell Electric Light Corporation, 29 Market Street	8481
	Lowell Gas Light Company, 81 East Merrimack Street	6851
	<u>Transportation</u>	
	Boston & Maine Railroad, 101 Thorndike Street	2-7331
	New York, New Haven & Hartford Railroad Company, 8 Littleton Rd., Chelmsford, Mass.	2-5632
	<u>Communication</u>	
	Western Union Telegraph Company, 34 Central Street	7507
	New England Tel. & Tel. Company, 115 Appleton Street	9911
<u>Nearest State Police Barracks:</u>	North Andover, Mass.	No. And. 798

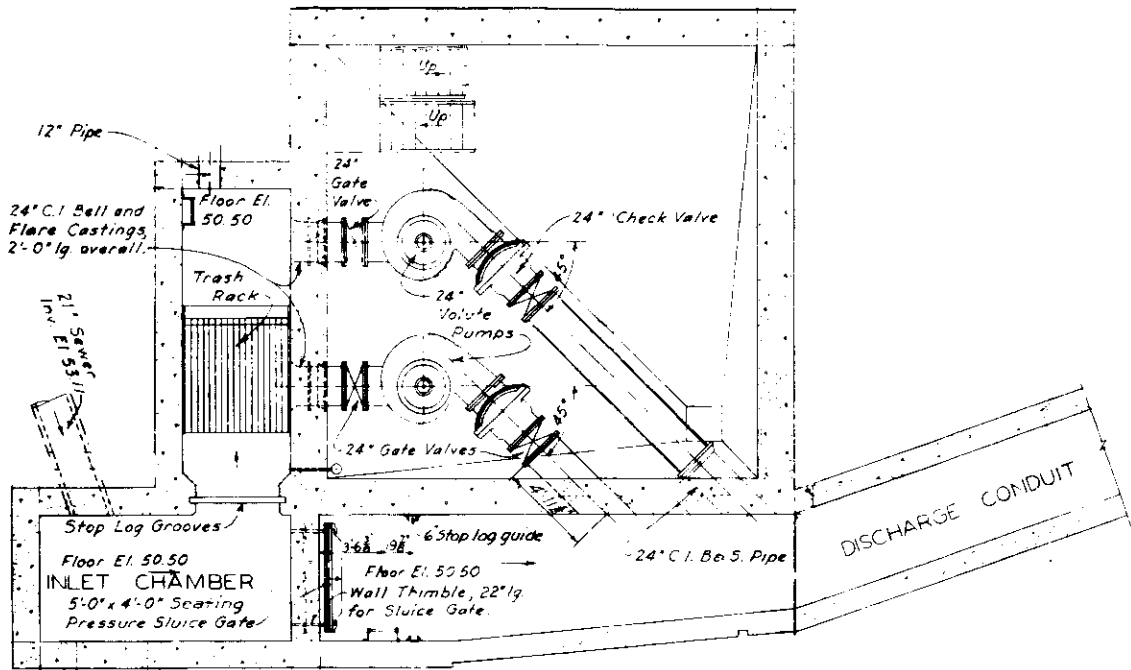
February 1954



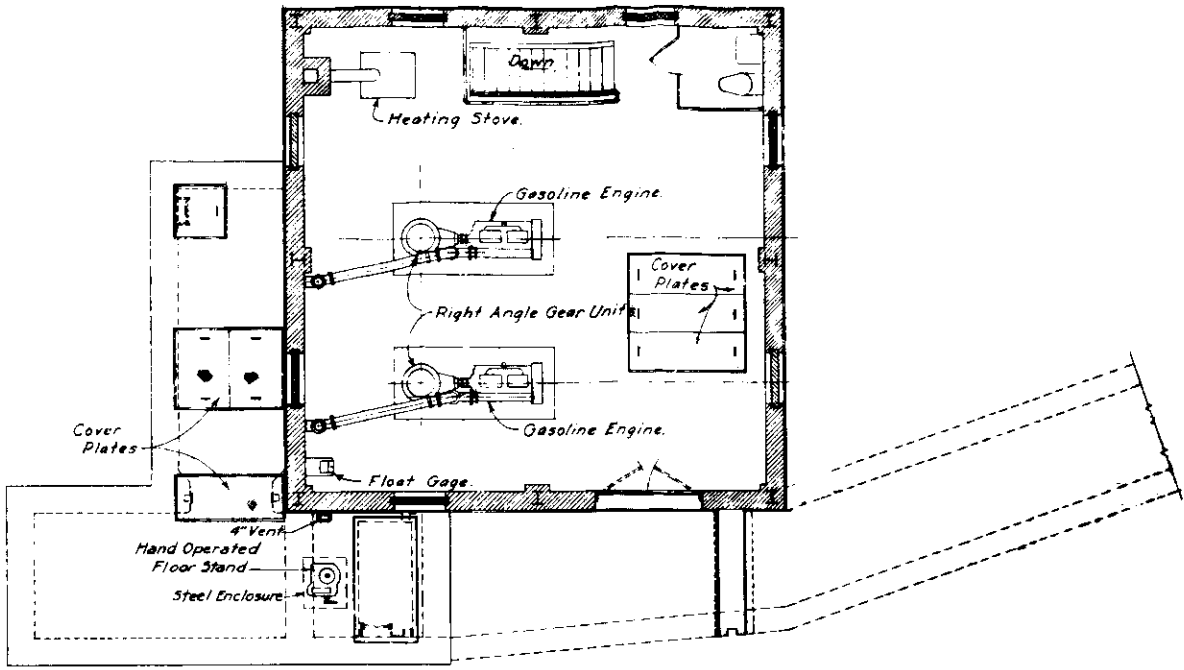


SECTION 31

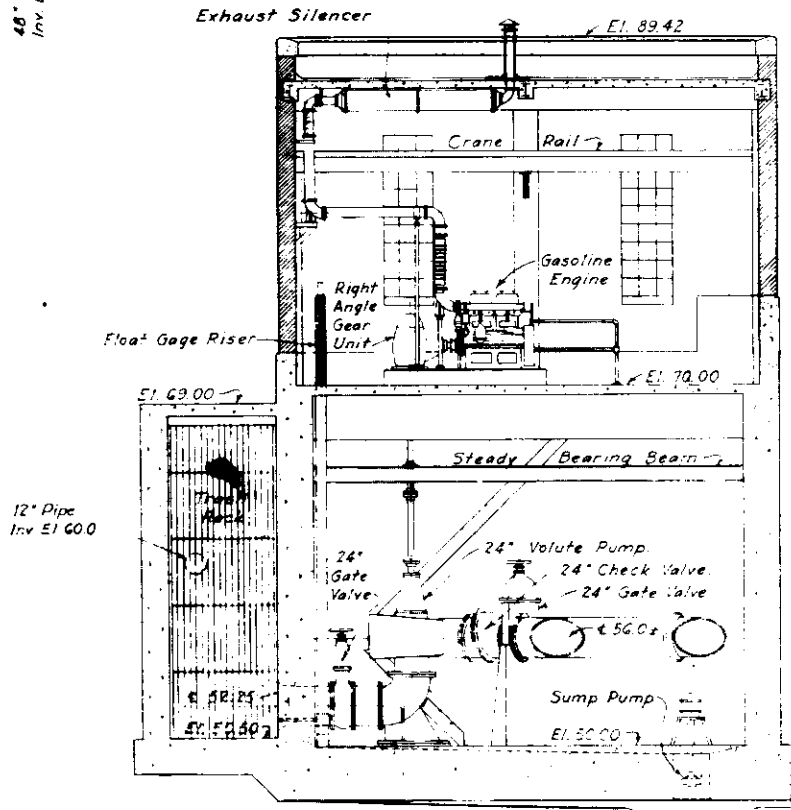
MERRIMACK VALLEY FLOOD CONTROL
FLOOD PROTECTION - LOWELL, MASS.
WEST STREET PUMPING STATION
GENERAL ARRANGEMENT OF EQUIPMENT NO. 1
SCALE: 1/4" = 1 FT.
NEW ENGLAND DIVISION, BOSTON, MASS.
FLOOD EMERGENCY MOBILIZATION PLAN



PUMP ROOM PLAN



ENGINE ROOM PLAN



SECTION A

MERRIMACK VALLEY FLOOD CONTROL
FLOOD PROTECTION - LOWELL, MASS.
BEAVER STREET PUMPING STATION
GENERAL ARRANGEMENT OF EQUIPMENT
SCALE: 1/4" = 1 FT.
NEW ENGLAND DIVISION, BOSTON, MASS.

FLOOD EMERGENCY MOBILIZATION PLAN

NASHUA, NEW HAMPSHIRE

The flood protective system for the City of Nashua is located on the right banks of the Merrimack and Nashua Rivers at their confluence near the easterly edge of the city. It consists of the following features:

- 200 linear feet of concrete flood wall
- 3,200 linear feet of earth dike
- 1 pumping station with overflow basin
- 2 drainage structures through dike

The dike starts at the Boston and Maine Railroad bridge which spans the Nashua River, extends easterly along the tops of the natural banks of the Nashua River to the Merrimack River, and continues southerly along the west bank of the Merrimack River to high ground just south of Crown Street. Another section of dike extends from the southern end of this high ground to the Boston and Maine Railroad tracks. The top of the dike and flood wall is at Elevation 122, which provides three and one-half feet of freeboard as controlled by existing Franklin and Blackwater Reservoirs.

The pumping station is located near the center of the dike system and adjacent to Bridge Street. It contains two 30" axial flow pumps with 150 H.P. electric motors and one 4,500 g.p.m. sewage pump with a 30 H.P. motor. The capacity of the station is supplemented by an emergency overflow basin which receives overflow from the pumping station when pump capacity is reached.

The method and sequence of operations in prosecuting a flood fight are as follows:

- a. Inspection of pressure manhole "H" on 24" drain near upstream end of dike, to insure tight closure.
- b. At river elevation of 106, close sluice gate at discharge chamber and place sewage pump in operation. The pump will be operated maintaining the sewer level between a minimum of 102 and a maximum elevation of 106.
- c. If sewage pump cannot keep the wet sump at 106.0 or lower, indicating that inflow is greater than capacity of sewage pump, open sluice gate between inlet chamber and wet sump and place one 30" pump in operation,
- d. Place second 30" pump in operation when water level continues to rise above Elevation 106. The 30" pumps should draw the sump level down to Elevation 102.
- e. At river elevation of 114.0 close 10" gate valve at south end of dike near Boston and Maine tracks,

February 1951

Any attempt to fight a flood above dike freeboard (Elevation 118.5) will require sandbag closures across the Boston and Maine tracks at both the upper and lower ends of the dike. This closure should be made only after coordination with operating officials of the Boston and Maine Railroad.

The ground grade adjacent to the river bend upstream from the Canal Street Bridge is slightly below the estimated maximum water surface elevation, a condition which will require local sandbagging in the event that a major flood on the Nashua River should occur concurrently with a major flood on the Merrimack River.

PREVIOUS HIGH WATER ELEVATIONS

Bridge St. Bridge
Elev. M.S.L.

Mar. 1936 Flood - approximately 127.4
Sep. 1938 Flood - approximately 118.0

Note: These stages are considerably modified
by the Franklin Falls and Blackwater
Reservoirs.

ESTIMATED SANDBAG REQUIREMENTS

Sandbag closures 5,000
Sand boils and sloughs 3,000

TOTAL 8,000

Recommended stock level for storage - 5,000 to 7,000
On hand 10 January 1952 - 100
Available in Manchester, N. H. - 5,000

February 1952

CITY OF NASHUA, N. H.

Nashua
Exchange

Mayor: Lester H. Burnham
City Hall
229 Main Street
(Res.) 273 Main Street

69
2029-R

City Engineer: A. E. Maynard
City Hall
(Res.) 120 Amherst Street

948
3156-W

Superintendent of Streets: Romeo Anger
City Tool House & Garage
E. Hollis Street
(Res.) 21 Atherton Avenue

316
3445-R

Chamber of Commerce: 120 Main Street

15

Police Department Headquarters: 229 Main Street

1480

Fire Department Headquarters: Church Street

2002

Red Cross Headquarters: 28 Concord Street

372

Transportation

Boston & Maine Railroad: Ticket Office
Freight Office

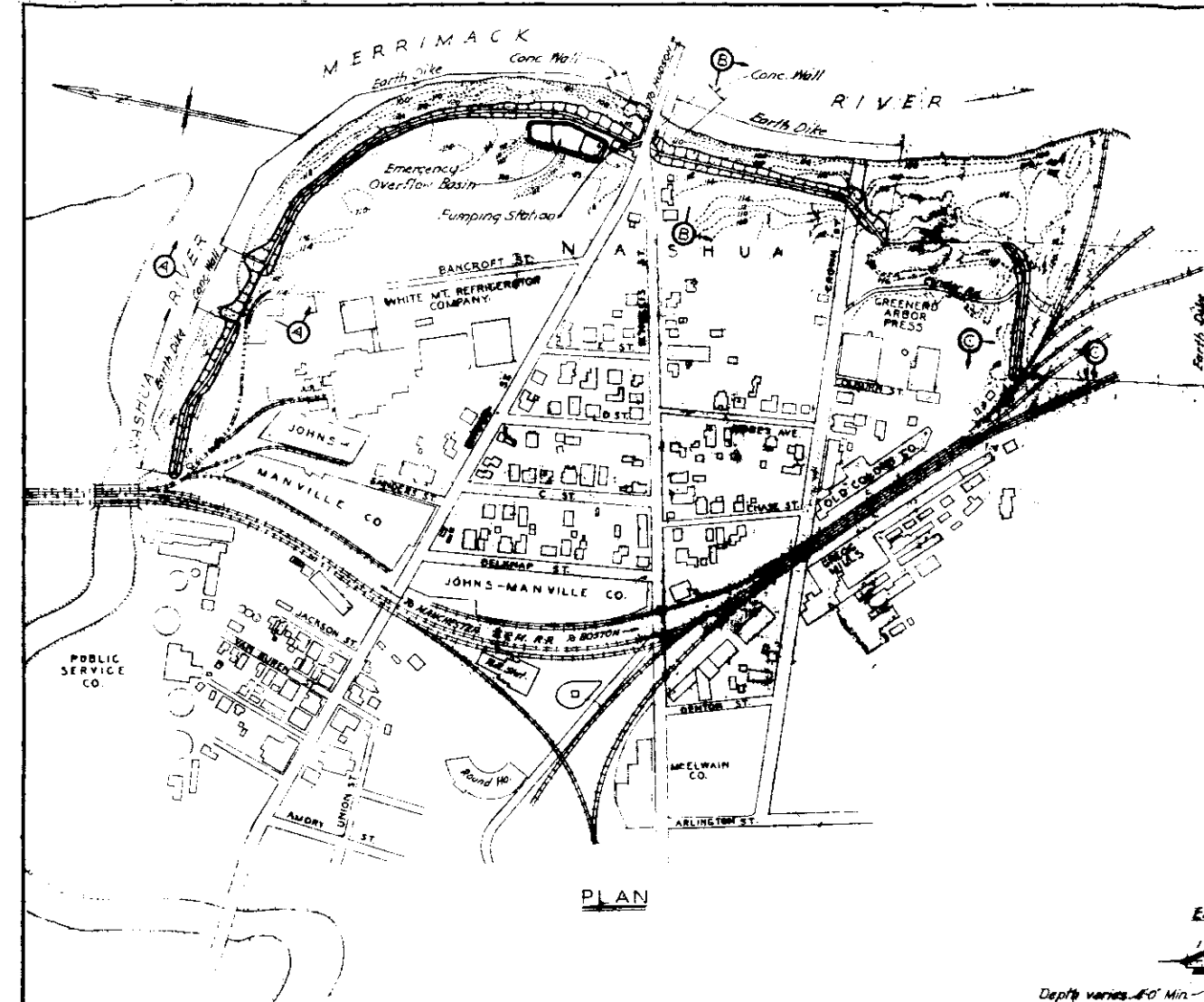
388
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Communication

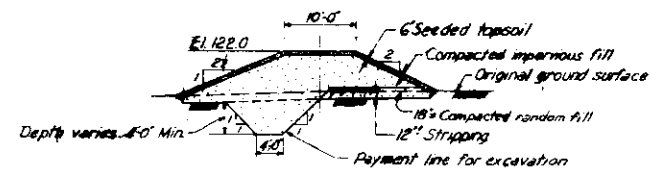
New England Telephone & Telegraph Co., 200 Main Street
Western Union Telegraph Company, 206 Main Street

9900
Western Union

February 1954

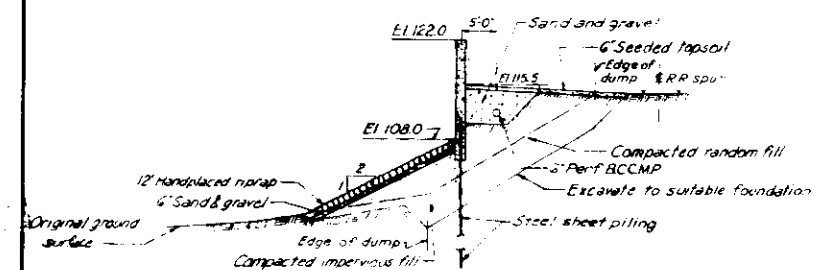


PLAN



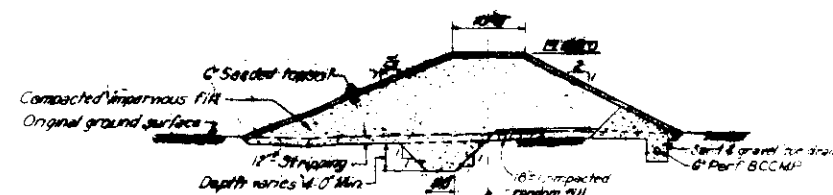
SECTION C-C

Scale: 1"=10'-0"



SECTION A-A

Scale: 1"=10'-0"



SECTION B-B

Scale: 1"=10'-0"

General Note:

Elevations on all drawings refer to U.S. & S. Datum.

MERRIMACK VALLEY FLOOD CONTROL
FLOOD PROTECTION--NASHUA, N. H.
LOCATION PLAN

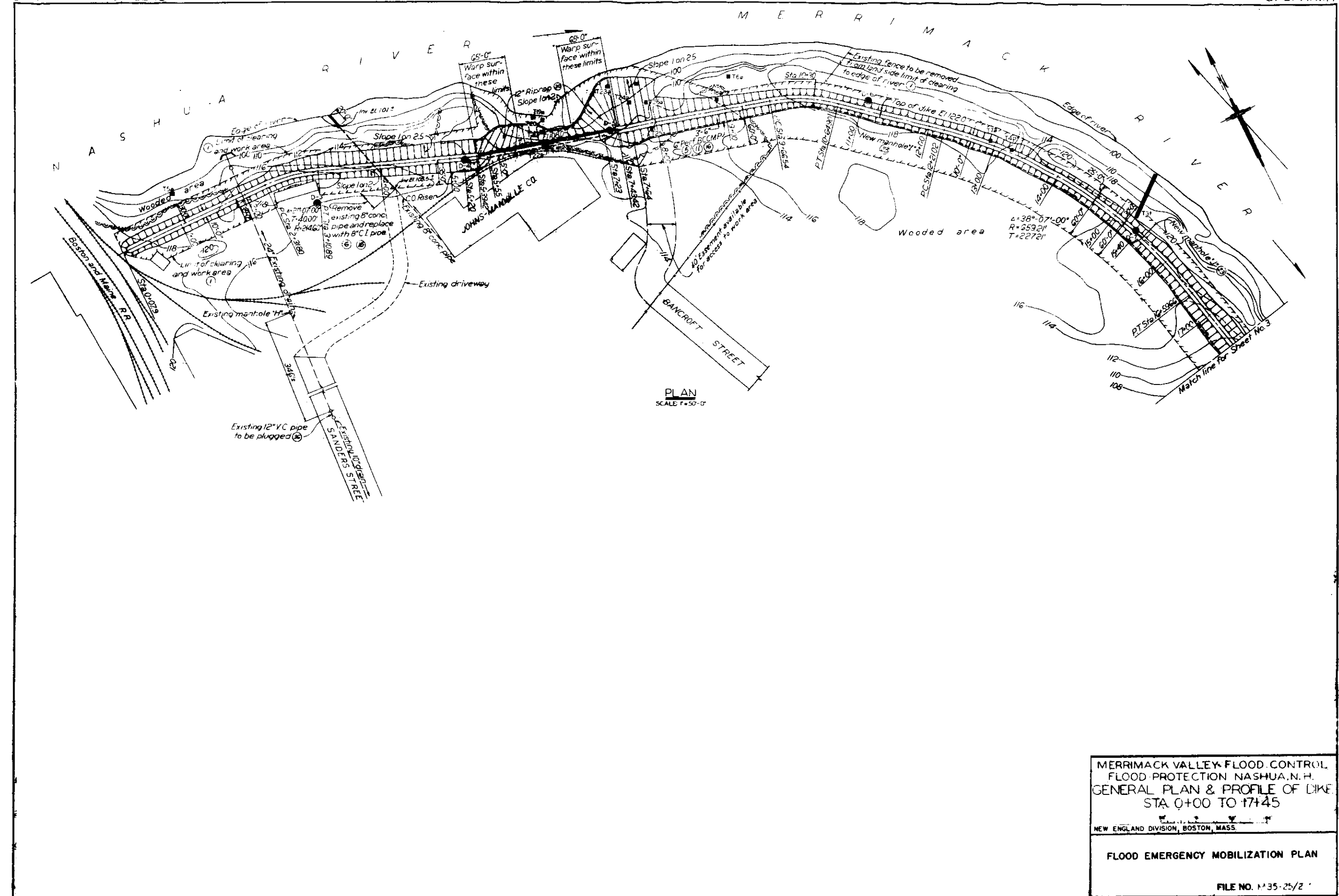
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NEW ENGLAND DIVISION, BOSTON, MASS.

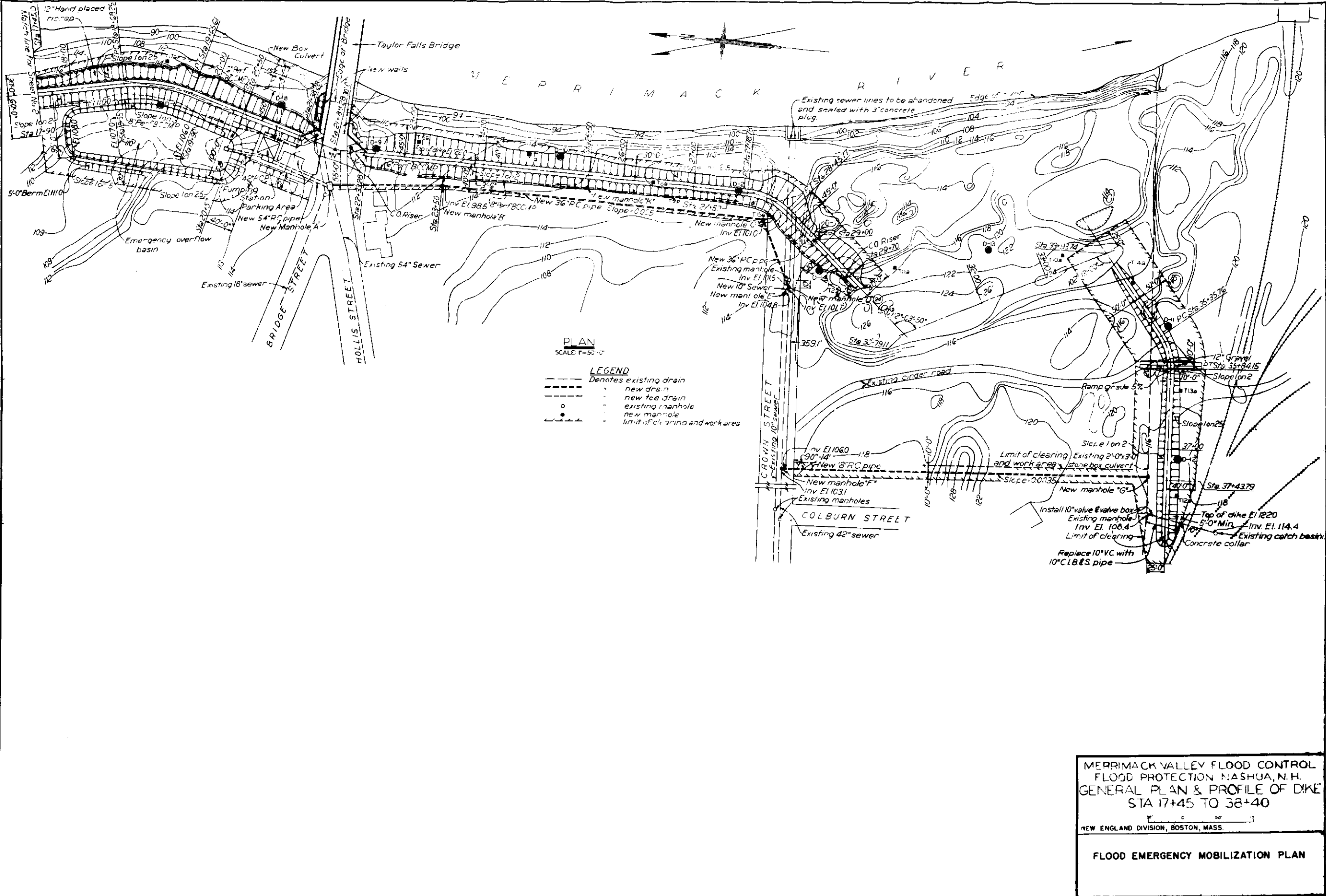
FLOOD EMERGENCY MOBILIZATION PLAN

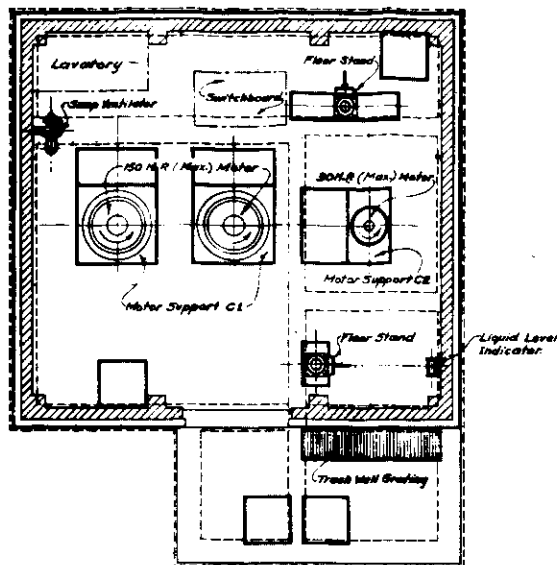
FILE NO. M 35-25/1

FEB. 1951

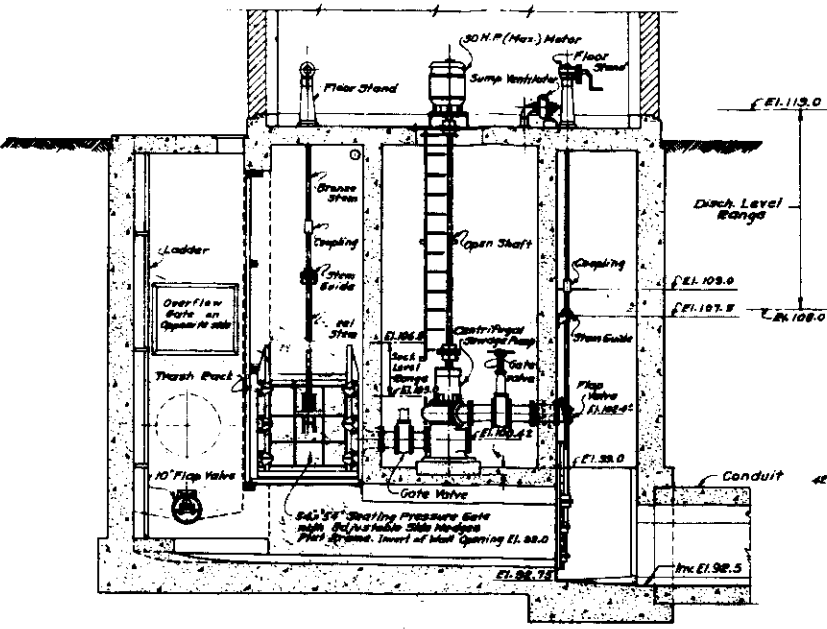
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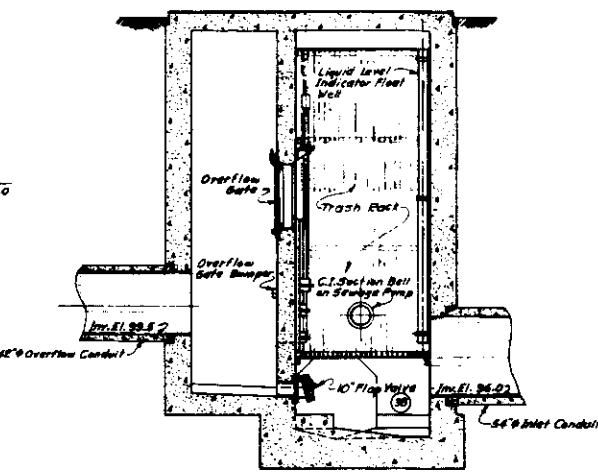




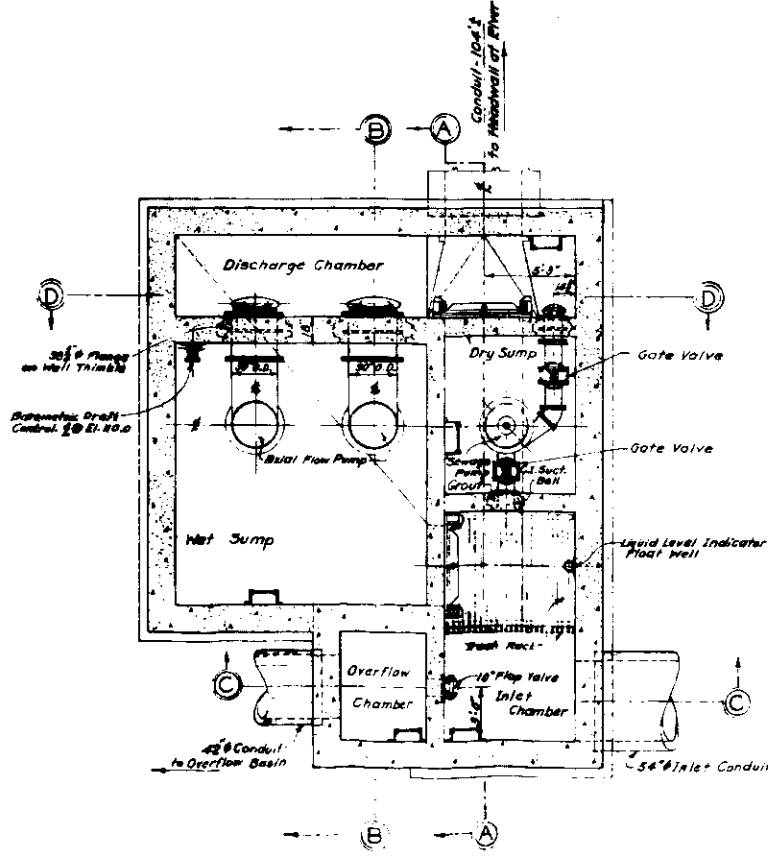
MOTOR ROOM PLAN
Scale: 1/4"=1'-0"



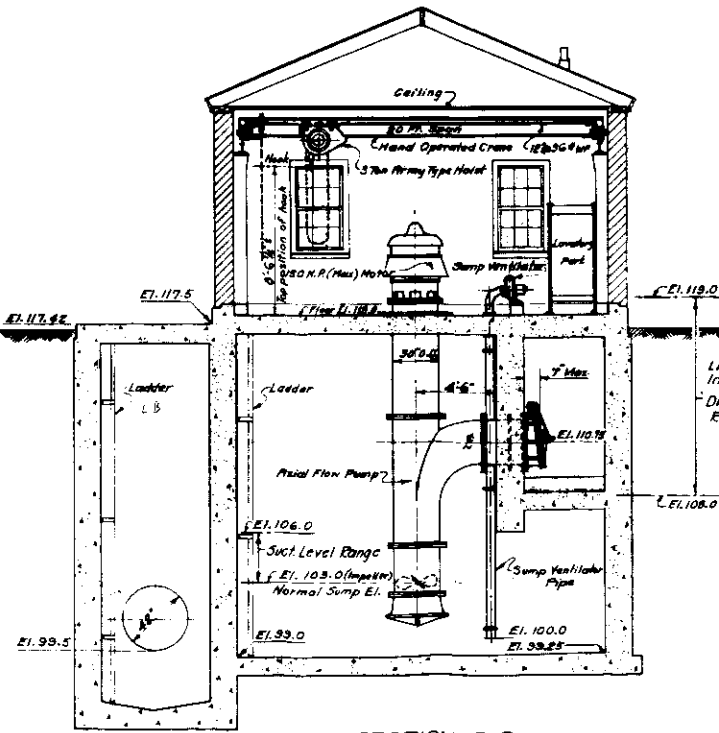
SECTION A-A
Scale: 1/4"=1'-0"



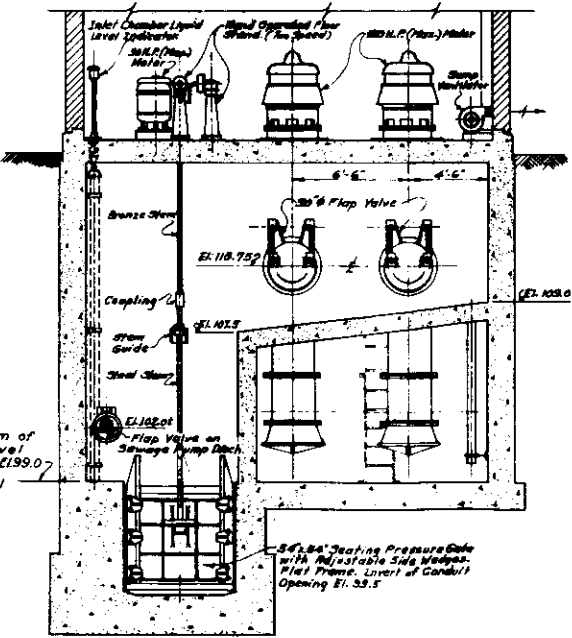
SECTION C-C
Scale: 1/4"=1'-0"



SUMP ROOM PLAN
Scale: 1/4"=1'-0"



SECTION B-B
Scale: 1/4"=1'-0"



SECTION D-D
Scale: 1/4"=1'-0"

MERRIMACK VALLEY FLOOD CONTROL
FLOOD PROTECTION, NASHUA, N.H.
PUMPING STATION
ARRANGEMENT OF EQUIPMENT

NEW ENGLAND DIVISION, BOSTON, MASS.

FLOOD EMERGENCY MOBILIZATION PLAN

FILE NO. M 35-23/16

FITCHBURG, MASSACHUSETTS

The flood protection system at Fitchburg extends along the North Nashua River, beginning at a point in Leominster, Massachusetts, 0.6 mile downstream from the Fitchburg-Leominster boundary line, and extending upstream a distance of approximately 5 miles, almost to the Coween Mill Dam in Fitchburg, Massachusetts. It is primarily a channel improvement and is made up of the following:

- a. Channel excavation and realignment.
- b. Levee construction.
- c. Riprapping.
- d. Underpinning of designated existing structures.
- e. Construction of new retaining walls and raising of existing retaining walls.
- f. Reconstruction of the railroad trestle at Station 56+32.
- g. Reconstruction of Falulah Road Bridge Pier.
- h. Removal of six existing dams.

The improvements provide a channel to handle floods of approximately 9,000 second feet, and should, with some regulation of the reservoirs that are located on the stream, accommodate a flood of the magnitude of that of 1936.

The procedure to be followed in this area in the event of flood consists principally of patrolling to determine areas which may be threatened, and of repairing such areas by the methods outlined in paragraph 4-04 d.

ESTIMATED SANDBAG REQUIREMENTS

Sand boils and repairing erosion	5,000
----------------------------------	-------

February 1951

CITY OF FITCHBURG, MASS.

Fitchburg
Exchange

<u>Mayor:</u> Peter J. Levanti City Hall	3-4821
<u>City Engineer:</u> Joseph Pierce Commissioner of Public Works City Hall	3-4821
<u>Department of Public Works:</u> City Hall	2-1607
<u>Chamber of Commerce:</u> 455 Main St.	3-6487
<u>Police Department Headquarters:</u> 20 Elm St.	3-4355
<u>Fire Department Headquarters:</u> 28 Oliver St.	3-4801
<u>Red Cross Headquarters:</u> 745 Main St. .	3-6737

Utilities

Fitchburg Gas & Electric Light Co., 655 Main St.	3-6931
New England Power Co., Maintenance Dept., Pratt Pond	2-2632

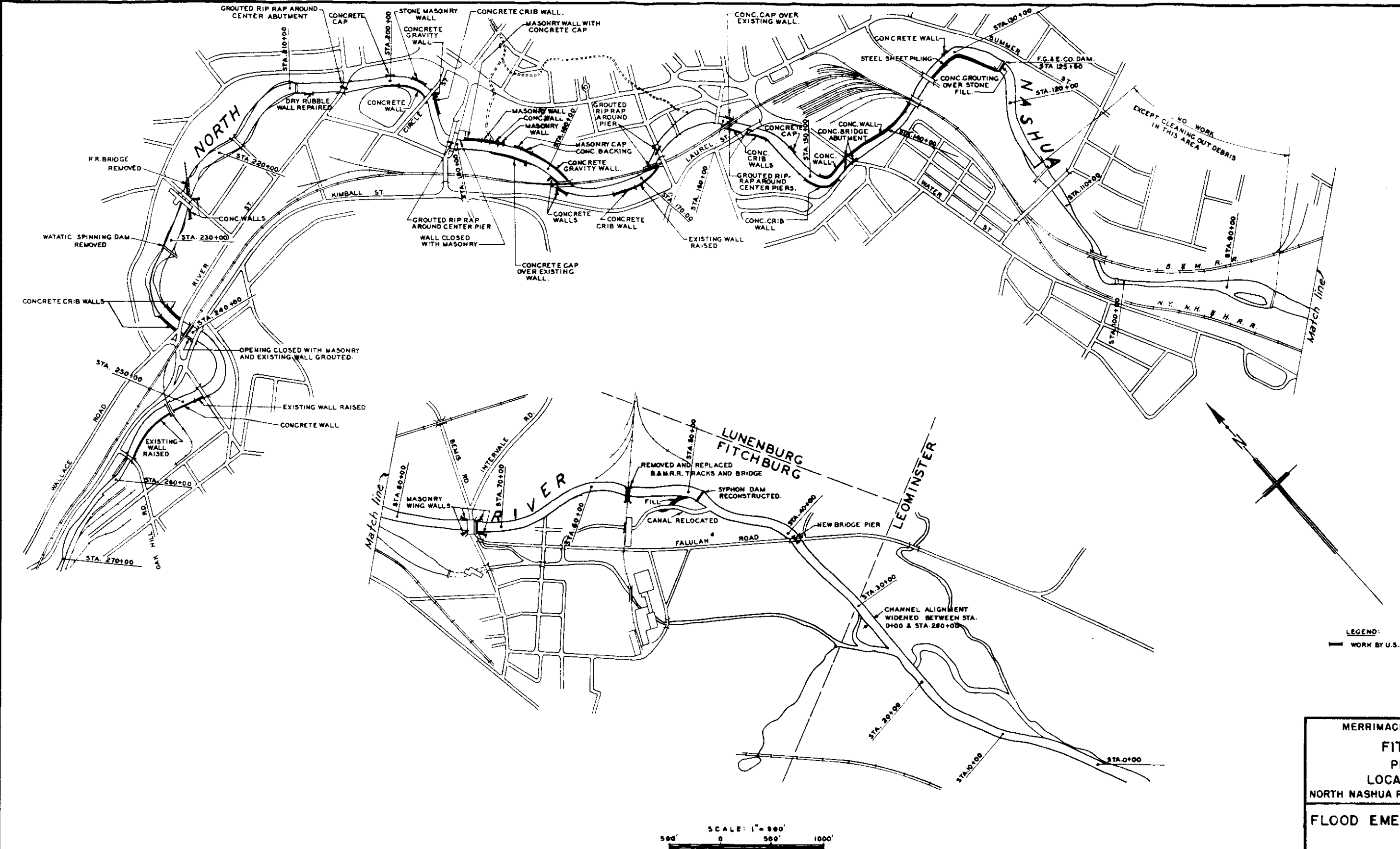
Transportation

N.Y., N.H. & H. RR Co., Freight House, 74 Water St.	3-4844
Boston & Maine Railroad	2-1727

Communication

Western Union Telegraph Co., 266 Main St.	3-3741
New England Tel. & Tel. Co., 676 Main St.	2-9911
<u>Nearest State Police Barracks:</u> Shirley, Mass.	<u>Shirley</u> 416

February 1951



MERRIMACK RIVER FLOOD
FITCHBURG, MA
PROJECT MAP
LOCAL PROTECTION
NORTH NASHUA RIVER
FLOOD EMERGENCY MOBI
PREPARED BY
CORPS OF ENGINEERS,
OFFICE OF THE DIVISION
NEW ENGLAND DIVISION, B

EDWARD MACDOWELL DAM

The Edward MacDowell Dam is located on the Nubanusit Brook, a tributary of the Contoocook River. The area controlled by the reservoir is 44 square miles. The dam site is located in the village of West Peterborough, New Hampshire, approximately 35 miles southwest of Concord, New Hampshire.

The construction of the dam and appurtenant structures was essentially completed in January of 1950. The reservoir is now available for flood storage.

The maintenance and operation of the structure is a responsibility of the New England Division. Gate operation is controlled normally by direct instructions to the damtender from the Reservoir Regulation Section of the Engineering Division. In case of breakdown of the telephonic communication system, the damtender will operate gates in accordance with instructions contained in the Manual of Operation, Edward MacDowell Reservoir.

El. 904 (904 on Gage)

Damtender -- Harry A. Morrison
Phone -- Peterboro 470

Asst. Damtender -- Kenneth S. Wetherbee
Charbonne Street
East Jaffrey, N. H.
Phone -- None

February 1952

BLACKWATER DAM

The Blackwater Dam is located on the Blackwater River in New Hampshire, a tributary of the Contoocook River, 8.2 miles above the confluence with the Contoocook River and 118.8 miles above the mouth of the Merrimack River. The reservoir, which controls a drainage area of 127.5 square miles, has an area at spillway lip (El. 566) of 3140 acres and a flood control storage capacity of 46,000 acre-feet, which is equivalent to 6.8 inches of runoff.

The construction of the dam and appurtenances was completed during the fall of 1941. The reservoir is now available for flood storage.

The maintenance and operation of the structure is a responsibility of the New England Division. Gate operation is to be in accordance with a fixed schedule incorporated into the Manual of Operation and Maintenance of the Blackwater Dam, issued by this office.

El. - 511 (511 on Gage)

Damtender - Arthur F. Snodgrass
Phone - Salisbury, N.H., 20-3

February 1951

FRANKLIN FALLS DAM

The Franklin Falls Dam is located on the Pemigewasset River, 2.8 miles above its confluence with the Winnepesaukee River in New Hampshire. The reservoir has a tributary drainage area of 1000 square miles and covers an area of 2950 acres at an elevation of 395 M.S.L. It has a storage of 170,000 acre-feet equivalent to 3.2 inches of run-off.

The construction of the dam and appurtenances was completed during the fall of 1943. The reservoir is now available for flood storage.

The maintenance and operation of the structure is a responsibility of the New England Division. Gate operation is to be in accordance with a fixed schedule incorporated into the Manual of Operation and Maintenance of the Franklin Falls Dam, issued by this office.

El. - 300 (300 on Gage)

Damtender - Norris M. Humphrey
Phone - Franklin, N. H.
36 - Residence
37 - Field Office

Asst. Damtender - Merton D. Drosby
5 Orchard Street
Franklin, N. H.
Phone - Franklin 654

Asst. Damtender - Alfred J. Sawicki
Glory Avenue
Franklin, New Hampshire
Phone - Franklin 773-W

February 1952

NORWALK, CONNECTICUT

The flood control system at Norwalk is primarily a channel improvement of the Norwalk River from a point 1,100 feet upstream of the Perry Avenue highway bridge to a point 600 feet downstream of the bridge. The work consisted of:

- (a) . Channel enlargement and realignment;
- (b) Construction of 1,400 feet of dike along the right (west) bank of the river;
- (c) Removal of the Connecticut Lace Company Dam;
- (d) Installation of a row of sheet-piling immediately downstream of the Perry Avenue Bridge.

The improvements provide a channel which will accommodate a flood greater than twice the estimated flood of record on the Norwalk River, with a minimum of three feet of freeboard on the dike.

The procedure to be followed in this area in the event of flood consists principally of patrolling to determine areas which may be threatened, and of repairing such areas by the methods outlined in paragraph 4-04 d.

ESTIMATED S.L.N.D.B.G. REQUIREMENTS

Sand boils and repairing erosion - 1,000

February 1952

CITY OF NORWALK, CONNECTICUT

	<u>Norwalk Exchange</u>
<u>Mayor:</u> Irving C. Freese City Hall	6-1460
<u>Commissioner of Public Works:</u> Paul J. James City Hall (Residence)	6-4401 6-9364
<u>Superintendent of Streets:</u> William E. Silk City Hall	6-4401
<u>Chamber of Commerce:</u> 520 West Avenue	6-2521
<u>Police Department Headquarters:</u> West Avenue	6-4412
<u>Fire Department Headquarters:</u> Franklin Street South Norwalk	6-3312
<u>Red Cross Headquarters:</u> 7 Academy Street	6-1635

Utilities
(Gas and Electric)

Connecticut Light and Power Company, 69 Wall Street 6-1641

Transportation

New York, New Haven & Hartford Railroad 6-4471

Communication

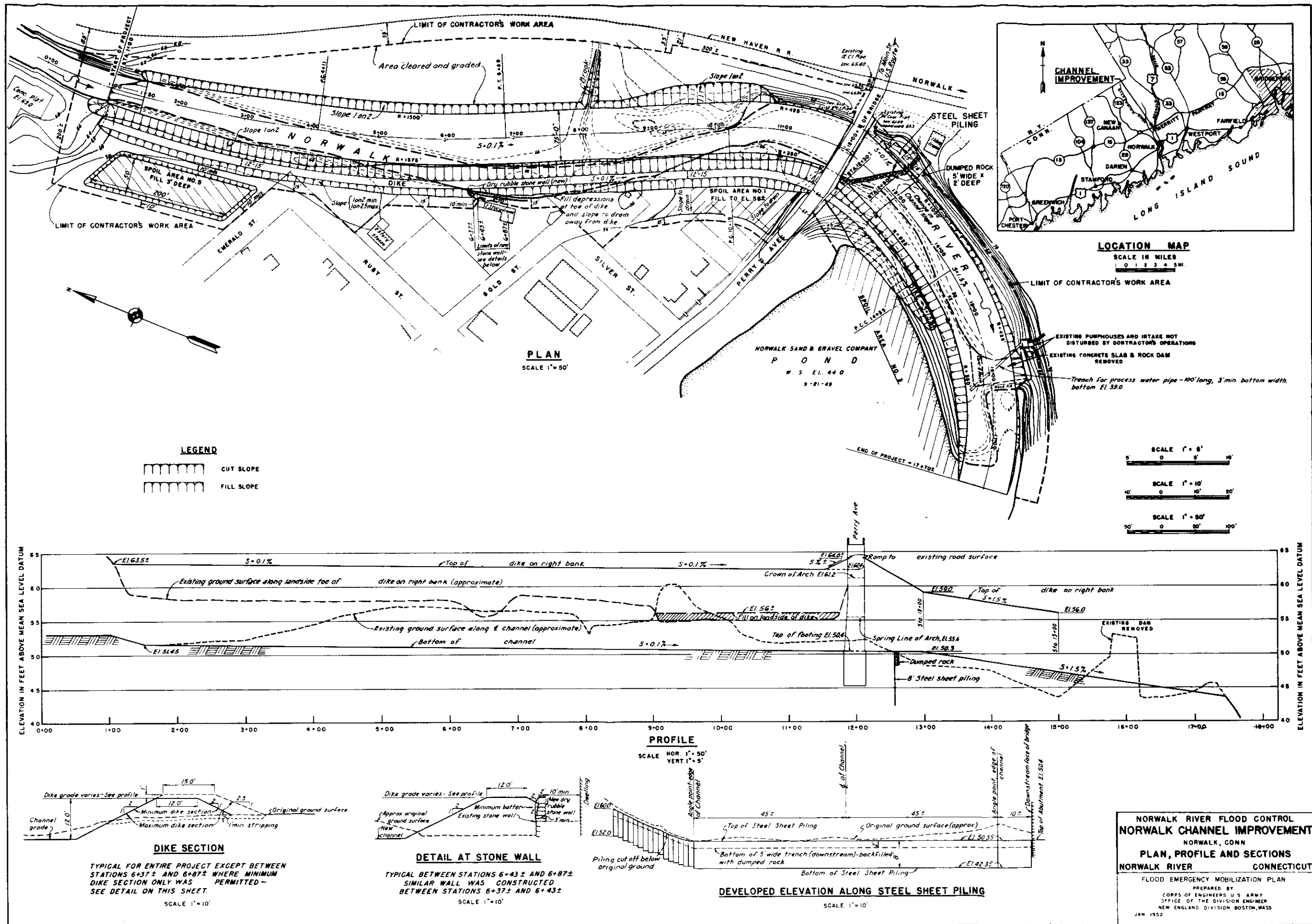
Western Union Telegraph Company, 29 South Main Street,
South Norwalk 6-5533

Southern New England Telephone Company,
17 Washington Street, South Norwalk 6-9221

Nearest State Police Barracks:

State Police Station G, Westport, Conn. Westport
2-4131

February 1952



MANSFIELD HOLLOW DAM

The Mansfield Hollow Dam is at Mansfield Hollow, Connecticut, on the Natchaug River about 5.3 miles above its confluence with the Willimantic River. It is located about 4 miles northeast of the city of Willimantic, Connecticut. The reservoir extends upstream 3 miles on the Natchaug River, 2.3 miles on the Mount Hope River, and 3.2 miles on the Fenton River.

The construction of the dam and appurtenant structures is essentially complete, and would be available for use in the event of a flood emergency.

The maintenance and operation of the structure is a responsibility of the New England Division. Gate operation is controlled normally by direct instructions to the damtender from the Reservoir Regulation Section of the Engineering Division. When telephonic or other means of communication fail, the damtender will operate the gates in accordance with instructions contained in the Manual for Reservoir Regulation for Mansfield Hollow.

0 on Gage = Elevation 195.0 (Invert of lowest gates)

Damtender -- N. R. Altomare
North Windham, Connecticut

Phone -- Willimantic 3-5603

February 1952